Yashwantrao Chavan
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V101:B. Sc. (Hospitality and Tourism Studies)
V102: B.Sc. (Hospitality Studies & Catering Services)

HTS 101: Food Production Foundation -1

YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY

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V101: B. Sc. Hospitality and Tourism Studies
(2016 Pattern)

V102: B. Sc. Hospitality Studies and Catering Services
(2016 Pattern)

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Semester – 1

HTS101: Food Production Foundation -I

Theory: 4 Credits; Total Hours =60
Practical: 2 Credits, Total Hours =60

Course Contents:

Unit – 1 Professional Kitchen & Cooking: - Introduction, Definition, and its importance; Personal & Kitchen Hygiene, Uniform, Protective clothing, Kitchen Layouts(Basic, Bulk and Show kitchens), Hierarchy of Kitchen Department, Classical Kitchen Brigade, , Modern Staffing in various hotels, Duties & Responsibilities of various chefs in kitchen, their attributes; coordination of kitchen with other departments.

Unit – 2 Kitchen Equipments, Fuels & Safety: Kitchen Equipments, Classification, Description, Usage, Upkeep and Storage, Kitchen Tools, Knives, Their Usage, Care & Maintenance, Workstations, Safety Procedures, Fuel – Types, Usage and Precautions. Fire - Introduction, Types and handling fires and usage of extinguishers; Basic First Aid- Burns, Scalds, Cuts

Unit – 3 Ingredients used in cooking: Herbs & Spices, Cereals and Pulses, Fruits and Vegetables, and Salt, Sweeteners, Fat, Milk and Milk Products: - Introduction, Types, Purchasing, Storing Considerations and their key uses in kitchen

Unit – 4 Stocks, Sauces, Soups and Salads: Stocks: Introduction, Classification, Usage, Preparation; Sauces: Introduction, Classification, Usage, Thickening Agents, Preparation of Mother Sauces, Understanding their derivatives, propriety sauces, making of good sauce, emerging trends, Soups: Introduction, Classification, Preparation, Salient Features, Care and precautions, trends in soup presentation. Salads: Introduction, compositions, types, dressings, emerging trends.

Suggested Readings:

- Accompaniments & Garnishes from waiter; Communicate: Fuller J. Barrie & Jenkins
- Cooking Essentials for the New Professional Chef
- Food Production Operations: Parvinder S Bali, Oxford University Press
- Larder Chef By M J Leto & W K H Bode Publisher: Butterworth- Heinemann
- Modern Cookery (Vol- I) By Philip E. Thangam, Publisher: Orient Longman
- Practical Cookery By Kinton & Cessarani
- Practical Professional Cookery By Kauffman & Cracknell
- Professional Cooking by Wayne Gislen, Publisher Le Cordon Bleu
- Purchasing Selection and Procurement for the Hospitality Industry By Andrew Hale Feinstein and John M. Stefanelli
- The Professional Chef: Le Rol A. Polsom
- Theory of Catering By Kinton & Cessarani
- Theory of Cookery By K Arora, Publisher: Frank Brothers

UNIT 1 PROFESSIONAL KITCHEN & COOKING

Structure:

1.0 BEFORE WE BEGIN

We will start our journey into the discipline of Food Production with the place where it all begins. This unit is about professional kitchen. Professional kitchen is the kitchen at the restaurant or hotel. We will give you a formal definition of the professional kitchen in the beginning of the unit. Professional kitchen are important part of hospitality industry, be it cruise luxury liner, hotels or restaurants. We will study the concepts in personal and professional hygiene and sanitation. As a working professional you need to take safety precautions as well as maintain the necessary cleanliness. No one would like to eat at place which is unclean or eat something prepared by a sick or unclean person. Hence we will teach you how to take care of such issues. Most restaurants and hotels have uniforms and protective clothing for all the staff. Uniform gives a sense of belonging to the staff and makes it easy to identify them as members of the staff by the clients and guests. We will understand the important concepts about uniforms in this unit.

A professional kitchen has a very well defined hierarchy of kitchen staff. We will learn about it in details. WE will try to understand the roles of the various types of chefs and other staff members and what attributes they should possess in order to be able to do their jobs properly.

1.1 UNIT OBJECTIVES:

After studying this unit you will be able to

- Describe a professional kitchen
- Define professional kitchen
- Explain the importance of kitchen
- Describe ways to maintain the professional hygiene
- Explain what is meant by Professional uniform and protective clothing
- Describe kitchen layouts
- Explain classical kitchen brigade
- Describe the functions of the various chefs
- Describe what attributes the various chefs should possess to meet the professional needs
- Explain how kitchen coordinates with the other staffs in hotel.

1.2 INTRODUCTION TO PROFESSIONAL KITCHEN

The purpose of kitchen organization is to produce high standard and good quality food for the required number of people, on time, by efficiently using staff, equipment and materials. Regardless of the size of the organization, the factors which primarily determine the standard of the organization include the items on the menu and the methods used to prepare and present the menu items. The organization of the kitchen is in accordance with the size and types of the establishment. Organization chiefly depends on the following factors

- Menu
- Type of establishment
- Size of operation

- Facilities available
- Human resource available

The organization of a kitchen, where hundreds of chef are accountable for preparing food for large banquets, is different from that of a small restaurant catering to a few people. The working varies from one kitchen to another, even if the nature of the two or more kitchens is similar. This is because each chef has his own way of running the kitchen. It has been observed that dividing the work of the kitchen into section gives good result in terms of productivity and efficiency. This system was introduced by chef Georges Auguste Escoffier, a French chef, who organized his kitchen in hierarchical section, with each section run by the head chef. According to the party system, the kitchen was divided into sections, where each section was responsible for contributing to the food production system. The principles of organization represent a standard practice. However, this does not determine the number of sections and staff required for a particular kitchen. When it comes to organizing a kitchen, certain factors such as size of the menu, number of persons to be served and management policy are considered by catering establishments. The latest trend is to go with the size of operation. It is the production that determines the number of section and staff members required for a particular kitchen. When it comes to organizing a kitchen , certain factors such as size of the menu, number of persons to be served and management policy are considered by catering establishment . The latest trend is to go with the size of operation. It is the production that determines the number of staff members required for a particular job. The kitchen of a large organization, which caters to a large number of people, will have more sections is determined by the amount of work to be done and significance of the contribution of each section to the work. Today, with the advent of labour saving machines, readymade food items and combined catering equipment, such as microwave cum convection ovens, the number of sections in a kitchen has been reduced.

A large number of chefs an assistant were employed earlier. Certain sections were combined for convenience. Satellite kitchens were located away from the main kitchen. Currently kitchens are smaller with less staff most of whom are multi-talented.

1.3 DEFINITION AND IMPORTANCE OF PROFESSIONAL KITCHEN

We all know the kitchen is the place where the food is prepared by cooking. We all have kitchens in our houses which take care of our families. You may call such kitchen as private or personal kitchen. A professional kitchen is the kitchen used for commercial purposes, like in a hotel or a restaurant or industries.

We may define a professional kitchen as a place where food is prepared on a commercial basis. We all have kitchens at our homes, these are places where we prepare our food for our personal consumption and without commercial purposes. We cannot call our home kitchens as Professional Kitchen as it does not have commercial purpose. The kitchens at the restaurants, clubs, messes and hotels prepare the food for the consumptions of the clients or patrons with a

purpose of selling the food on fees charged on per dish, monthly or yearly basis. The preparation of such food is for customers who may be stranger to the kitchen staff and involves taking extra caution regarding health, hygiene, culture and religious considerations.

Check your progress -1

1. Which of the following is not an example of professional kitchen

   (a) Kitchen in a Restaurant
   (b) Kitchen at a home
   (c) Kitchen in a mess
   (d) Kitchen in a club

Why is the professional kitchen important? Consider a world in which professional kitchens do not exist. What would happen? Suppose you have to travel to a new city for a few days, how would you survive? You would have to take your meals for all these days along with you or you will have to carry your kitchen with you. The cost of carrying your raw material, utensils and fuel would make your journey extra expensive.

Thus professional kitchen serve as important establishments for travelers. The professional kitchens at restaurants and hotels make your journey more convenient. Similarly, messes at the hostels where students and working bachelors stay, allow their inn-mates lives better as they can spend more time on studying or doing their professional activities.

Restaurants also allow a person to enjoy foods prepared by extremely skillful professional form various different cultures. For example, suppose you wish to taste a South Indian dish prepared by an expert cook, what do you do? You go to a professional restaurant and you have a choice of dishes. If you like the taste of dish prepared by a cook, you may visit that place again. If the professional kitchen were not there, you would have had tough time procuring the ingredient in such small quantities as required by you. You would have not known the small things which matter in preparing the dishes with right flavor and taste. As a non-expert preparing a new dish, you are prone to prepare dish which has food poison or develop toxic elements accidentally.

Check your progress -2

A professional kitchen does not

(a) Add convenience to your travelling experience
(b) Allow you to taste new dishes
(c) Save your time if you are a student staying at hostel

(d) Help you to become a great entertainer

1.4 PROFESSIONAL KITCHEN HYGEINE

Any area where food is stored, cooked, or served should be thoroughly and regularly cleaned to remove dirt,dust, and food particles. These harbour bacteria and also attract vermin such as flies and rodents.

1.4.1 Sanitation

Sanitation is the process of arresting the growth of microorganisms such as bacteria, virus, fungus and providing a germ free environment.

FLOORS

Floors in the preparation areas should be washed daily. Sweeping unsettles dust, so it should not be done while food and clean utensils are uncovered. The dinning area should be cleaned after each sitting. Any spillages, particularly fat or liquid, must be attended to immediately for safety reasons.

BENCHES AND SHELVES:

Bench surface come in direct contact with food and should be wiped down after use to remove food particles, which can contaminate other food placed on the bench.

SINKS

Food scraps should be removed from the strainers after the sink has been drained as they can provide just the right conditions for rapid bacterial growth and can also cause blockages.

RUBBISH BINS

Food should be disposed of in dust bins that are lined. Bins should be emptied regularly to avoid attracting insects and rodents.

REFRIGERATORS AND COLD ROOMS

These should be cleaned thoroughly on a weekly basis. Food or liquid spillages should be wiped up properly in the refrigerator. Removable parts, such as trays, should be washed. The interior surface can then be scrubbed.

EQUIPMENT

Clean each piece of equipment after every use. Dirty equipment can transmit harmful bacteria to food which are being prepared using this equipment. The following steps can act as a guide for cleaning equipment:

- Loosen and remove food particles by scraping, rinsing or soaking.

- Wash with clean hot water, detergent and a scrubbing brush or scourer.
- Rinse in clean hot water.
- Dry the equipment using a dishwasher. Cloth towels can also be used but they should be changed frequently.

Check your progress -3

1. What is meant by "sanitation"?
2. What care should be taken to arrest the growth of bacteria on floors, sinks, dust bins. Refrigerator and other equipments?

1.4.2. FOOD HYGIENE

Food can easily build up bacteria if it is not stored and handled correctly. The most troublesome food are the highly perishable ones, such as dairy products, eggs, seafood, cooked and raw meats such as poultry, reheated prepared dishes and gravies. Consuming food contaminated with germs and bacteria can result in food poisoning. Symptoms of food poisoning include nausea, vomiting, stomach cramps and diarrhoea.

CONTAMINATION BY MICROORGANISMS

Microorganisms are microscopic forms of life which includes moulds, bacteria and yeasts. Microorganisms are harmful of which some are used in the preparation of food. For instance, moulds are used to make certain types of cheese, bacteria are used in yoghurt and yeast is used to make bread rise. Certain microorganisms are harmful and can cause food poisoning. These are known as pathogenic or disease- causing bacteria.

Types of harmful bacteria

The following are the three main types of bacteria commonly associated with food poisoning:

(i) Salmonella: Salmonella bacteria occur naturally in some food and can also be transferred to food by humans or animals. These organisms are found in the bowel, and so hands should be washed thoroughly after visiting the toilet. Animals also excrete Salmonella, so care must be taken that food does not come in contact with animal faces. The food items commonly affected by Salmonella include meat, especially sliced cooked meat, chicken, duck eggs, milk and dairy products. Salmonella is the main cause of food poisoning.

(ii) Staphylococcus aureus: Staphylococcus bacteria, which are found in faecal material, contain this organism. Food items most affected by this are cooked meats, stews and gravies. Its symptoms include severe nausea, vomiting and diarrhea.

(iii) Clostridium perfringens: Poisoning of clostridium is characterized by stomach ache and diarrhea. Its symptoms appear within eight to twenty two hours. Their microscopic size makes it

impossible to detect them with the naked eyes unless they are in large numbers. The appearance and flavour of the contaminated food is not changed by the presence of these bacteria.

Check your progress – 4

1. Why is "food sanitation" importnat?
2. What are the symptoms of food poisoing?
3. Which are the various types of micro-organisms which cause food poisioning?

CONTROLLING BACTERIAL GROWTH

1. Temperature:

Temperature is the most convenient way of regulating bacterial growth. Pathogenic bacteria are capable of growing within a temperature range of four degree to sixty degree Celsius, which is the most hazardous zone for the rapid growth of bacteria. It is between twenty to forty five degree Celsius. To prevent bacterial contamination, food must be held at four degree Celsius and above sixty degree Celsius;bacteria's remain inactive and can be prevent from multiplying though they are not killed.They remain dormant until the temperature is favourable for their growth. At 76^0C most bacteria's are destroyed.

2. Moistrure

Altering the moisture control content of food is another way of controlling bacterial growth. Dehydrating food increases its shelf life because bacteria do not grow in dry condition. Addition of salt and sugar are ways of protecting food from bacterial growth. Controlling moisture is not always an appropriate way of preventing contamination.

CONTAMINATION BY PESTS

Insects, rodents, corkage's and flies carry disease. Every precaution must be taken to eradicate them in the area where food is stored prepared and served. Rats and mice often live in filthy conditions and can contaminate food easily. The following steps can be taken to detect and deter them:

- Keep all kitchen surfaces clean. This makes it easy to detect the presence of rats or mice.
- Check entrances such as window frames, ventilation grilles, holes in walls, floors and ceilings and cracks.
- Do not leave food outside to attract rats and mice.

Flies and cockroaches spread germs and diseases. To prevent contamination by insects, following steps should be taken:

- Screens should have close fitting lids and should be emptied regularly
- Garbage bins should have close fitting lids and should be emptied regularly.
- All fruits and clean utensils should be covered were ever possible to prevent contact with flies and cockroach.
- Use an electronic insect killer.

Check your progress – 5

1. List the agents that control the growth of microorganisms?
2. What measures can be taken to control contamination by pest?
3. What is meant by "pests"?

CONTROLLING BACTERIAL GROWTH

The main cause of food spoilage is bacterial growth but food poisoning can also occur due to non- bacterial sources like chemical, radiation and pollution.

Chemicals

Harmful chemical such as lead and arsenic have been detected in food and can cause illness or even death. These products should never be stored near food or their containers used to store food. Food can be contaminated by insecticides, pesticides, fungicides which ca cause illness.

Radiation

Radioactive fallout from nuclear testing or nuclear accident can make food unfit for consumption. They can affect crops and livestock's.

Pollution

Despites strict pollution controls, many chemicals and industry waste find their way into rivers and soil and become a part of the food chain.

1.4.3 PERSONAL HYGIENE OF THE KITCHEN STAFF

Hygiene is the science and practice of preserving health and is an important subject for people working in the hotel and catering industry. Maintaining personal hygiene and cleanliness is important in order to prevent germ from getting transferred to food.

- **Hand:** It is essential to wash hands properly and regularly before and after every meal and also during the handling of food. After washing, hands should be rinsed and dried using a clean towel or with a hot air dryer. Hands and finger nails should be kept clean as they can easily transfer harmful bacteria to food.

- **Finger nails:** Keep the finger nails short and clean as dirt can easily accumulate under the nails and may get dislodged when handling food or making pastries. Nails should be clean using a nail brush and nail paint should be avoided.

- **Hair:** It is important to wash hair regularly and to keep them covered while handling food. Men's hair should be kept short and women's hair should be covered with a net or head gear.

- **Nose:** The nose should never be touched while handling food. Paper handkerchiefs should be used and disposed and immediately the hands should be washed.

- **Mouth:** The mouth or the lips should not be touched by hands or utensils. No cooking utensils should be used for tasting food nor should the finger be used for this purpose. There should be no coughing over the food and in the kitchen.

- **Ear:** Germs are also present in the ear cavities and therefore finger should not be used to scratch ears.

- **Cuts, burns and sores:** It is particularly important to keep all cuts, burns, scratches on the skin, covered with a water proof dressing. People with cuts and burns should not handle food.

- **Smoking:** Smoking in areas where food is being handled should be forbidden.

- **Spitting:** Spitting should never take place in or around the kitchen as germs can spread.

- **Cloths:** The cloth used for holding hot dishes should also be kept clean as it is often used for wiping knifes, dishes and pans.

Check your progress – 6

1. What is the importance of maintaining hygiene by the persons working in a kitchen?
2. What measures can be taken to maintain personal hygiene?
3. Which are the non-bacterial sources of food poisoning and spoilages?

1.5 UNIFORM AND PROTECTIVE CLOTHING

With provision of well-thought-out uniforms for hotel staff we may ensure proper grooming, thereby reflecting the standard of the hotel and creating a good impression on the guest. Having uniform also enables the guest to identify staff and their position in the hierarchy of organization. To the employee, it becomes a status symbol, creating a sense of belonging and thereby boosting his/her morale. In addition to the aesthetic appeal, uniforms are frequently designed to suit the task that is carried out.

You have two option in choosing Uniforms for your staff: you may use standard sizes or use made-to-measure clothings. Made-to-measure uniforms make the staff look smart and are essential for senior staff, who do not have physique as per standard measurements. Standard sizes lower the total requirement of uniforms but may be ill-fitting and do not look as smart. The number of sets of uniforms provided is dependent on the nature of the tasks being performed and whether the organization has an on or off-premises laundry. Uniforms are a large investment and the cost does not end with purchase. Maintenance and replacement also have to be considered. When designing an uniform, the functional, comfortable, practical as well as the aesthetic aspect, durability and "laundrability" ("washability" at laundry) must be considered. The uniform must harmonize with the décor.

Fig 1.1: *Uniforms add value to the hospitality staff*

Uniforms play a very important roles in establishing and reinforcing the image of a hotel or restaurant. After all, other aspects of housekeeping are inanimate, material things. It is the people who bring warmth and friendliness into these spaces and these people are the employees of the hotel.

1.6.1 UNIFORM OF A CHEF

The uniform of a chef plays an important role in his efficiency of work and also protects him/ her from unwanted accidents. Each and every item of the standard chef uniform has its own importance. Let us discuss it in details.

1. **Chef cap/chef hat:** The traditional chef's uniform (or chef's whites) includes a toque blanche (traditional hat), white double-breasted jacket, and houndstooth-patterned, black and white pants. It is a common uniform in the Western world.
   The toque is a chef's hat that dates back to the 16th century. Different heights may indicate rank within a kitchen. The 100 folds of the toque are said to represent the many different ways a chef knows to cook an egg. In more traditional restaurants, especially traditional French restaurants, the white chef's coat is standard and considered part of a traditional uniform and as a practical chef's garment. Most serious chefs wear white coats to signify the importance and high regard of their profession. Senior kitchen staffs are also identified by their black trousers. These embellishments of uniform also serve as an indicator between the bounds of salaried, and casual or part-time staff.

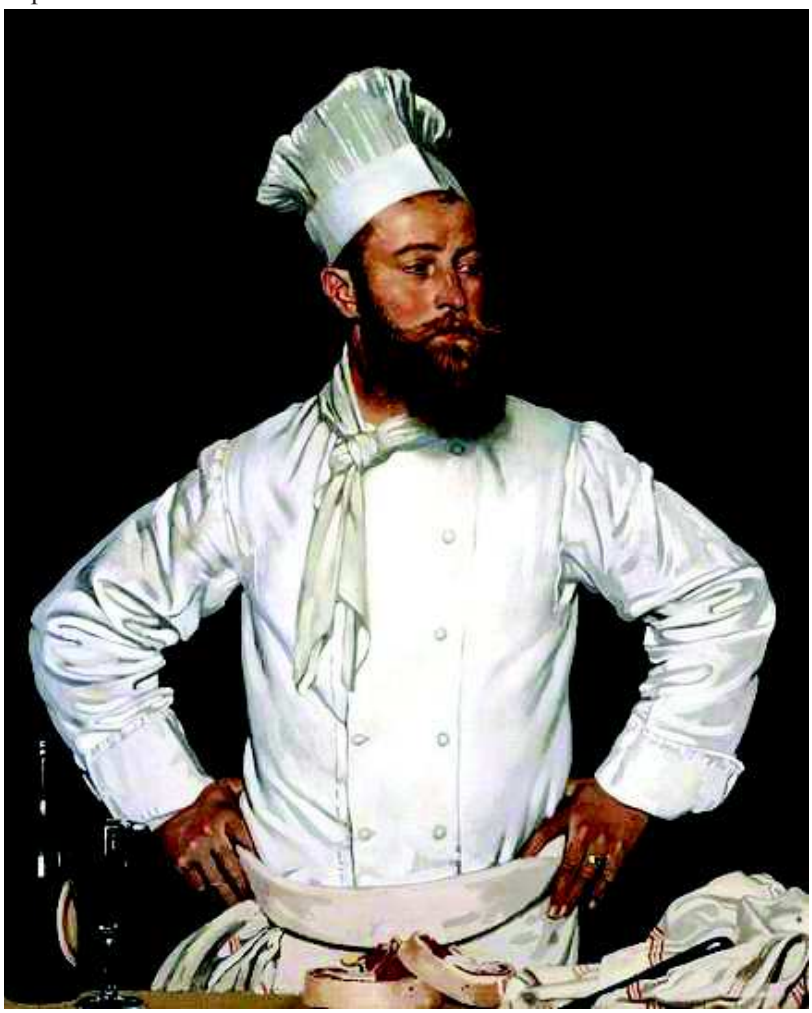


***Fig 1.2**: Chef's Uniform including hat, scarf and double brested chef coat (Wikipedia)*

2. **Scarf/Necktie:** Traditionally, chefs used to either keep a wiping cloth over their shoulder or used make a knot of the same over their neck. This cloth was worn so that they could mop, sweat away from their face and neck area. However, since this was not a good practice from the point of view of hygiene, health and safety, this practice was discarded and in place of that the chef started wearing a scarf or necktie just to enhance the overall appearance which has nothing to do with sweat.
3. **Double breasted chef coat/ chef jacket**: The double breasted jacket can be reversed to hide stains. The thick cotton cloth protects from the heat of stove and oven and protects from splattering of boiling liquids. Knotted cloth buttons were used to survive frequent washing and contact with hot items. White is intended to signify cleanliness and is generally worn by highly visible head chefs. Aprons shield the wearer's garments from food splatters and stains. The fabric used in the coat is generally heavy cotton which is quite resistant to fire and heat. In addition, the color of the coat is also kept white for the same reason. These coats are always stitched double breasted in order to solve dual problem; firstly, to prevent injuries from burns and scalds and secondly, it can hide the marks and stains just by flopping over the breast of the jacked and then re-buttoning it.
4. **Apron:** The material of the apron is usually exactly same as of a chef coat. It is tied in the waist and droops till the knee length. Its main purpose is also to prevent burns and scalds due to ignorance or spillage.
5. **Checkered trousers:** The material of the apron is normally exactly same as of a chef coat. It is tied in the waist and drops to the knee length. The main purpose is also to prevent burns and scalds due to ignorance or spillage.
6. **Steel top/plastic capped shoes:** Shoes should be non-slippery to prevent slipping on wet floors and should have a steel top cap to prevent injury from falling of sharp objects such as knives or other heavy utensils.

Check your progress – 7

1. What are the importance uniforms for the persons working in a kitchen?
2. What are the advantages of Made-to-measure uniforms?
3. What are the advantages of standard size uniforms?

1.6.2 ADVANTAGES OF UNIFORMS

Uniforms offer the following advantages:

- They ensure a well-groomed appearance for staff.
- If made in the right design for work, they provide comfort for the staff.

- They help to create an atmosphere or set the scene. For example, uniform may match the decor or the theme of the property.
- They help' to identify the hotel staff and their position to the guest.
- They enhance the spirit of teamwork
- If made in the right design for work, they provide comfort for the staff.
- They enhance the spirit of teamwork.
- They allow employees to save money on working clothes and costs of laundering.
- It is easier for staff to take up messy jobs when they know that their own clothes are not involved.
- Some uniforms may have a protective role. Some uniforms may confer prestige on the wearer.
- They allow employees to save money on working clothes and costs of laundering.

Fig 1.2: *Uniforms vary according to the function and roll of the staff*

1.6.3 Points to ponder while designing uniforms

The following points which should kept in mind while designing uniforms:

1. **Image and identity of the property:** It dependes on the target group you cater to. If your hotel follows western clientele then the' uniform should comply with such style and if a hotel follows traditional ambience then it should comply with traditional or ethnic style. If the hotel wishes to create a desirable, eye-catching, smart, efficient and professional images then the uniforms should be chosen to reflect and indeed create this kind of impression.

2.General profile of the employees: The cultural background, sex, age and so on of the hotel's employees need to be kept in mind along with hotel's ethos and the employee's work profiles. Uniforms should be designed in such a way that it suits everybody, whether the employee is fat, thin, tall or short. Some of the hotels also involve the middle management employees of different departments while designing the staff uniforms.

3. Purpose of work: At the time of designing uniform, purpose of work is given the highest score. E.g. pockets are one of the important part of uniform for some departments like engineering, therefore, a pair of dungarees or overalls must have several deep pockets for the maintenance employee to keep the tools handy. A waiter should have normal or medium size pockets to keep pen, lighter, pad, etc. There should be skid-proof shoes for kitchen employees. . Housekeeping staff is responsible to clean the rooms and public areas so their uniform should have short sleeves. Some uniform accessories such as the headwear of kitchen staff also fulfill an important hygiene function in addition to make their work easier.

4. Comfort in wear: Fabric selection is also a critical factor to consider when purchasing material for uniforms. Cotton outfits are preferred as uniforms because they are porous and more absorbent than polyester and cotton blends. However, blends with cotton are increasing in popularity because they have better soil-release qualities in general and at the same time retain some coolness. Comfort depends on the right fabric being used, and even more important on a fit to measure uniforms. Employees need to reach, bend, and stretch or squat while working, therefore, uniforms should be comfortable enough to work and it should not restrict the movement. Climatic conditions of the place must also be considered especially if the hotel is not centrally air-conditioned. Generally cooks and maintenance crew use 100 per cent cotton (drill) uniforms. ,

5. **Budget and value for money:** At the time of purchasing and designing uniforms, budget should be considered as to what extent it could be touched. Uniforms that look good are comfortable and maintain their appearance through a number of laundry cycles are more economical than cheaper garments that do not perform or last. Blends are easier and cheaper to maintain; however, blends are not recommended for employees working in greasy areas. Accessories in uniforms should be minimized as it becomes difficult to keep tab of them and usually the lower the expense.

6. Ease of availability of materials: The fabric and accessories chosen for the uniforms must be readily available whenever new uniforms are required.

7. Staff turnover: This is a big challenge to any organization and can be overcome if free-size uniforms are used. Trousers or skirts can have elasticized waistband to accommodate different sizes.

Check your progress – 8

1. What are the advantages uniforms for the persons working in a kitchen?
2. What are the various factors to be considered while designing the strategies for Uniforms?
3. What the importance of comfort to wear the uniform in the deciding the

strategies for designing uniforms?

1.6 KITCHEN LAYOUT

The following are the main sections of a kitchen

1. Preparatory section
2. Main cooking area
   Continental section
   Bakery and confectionery
   Indian section
3. Butchery

1.6.1 Preparatory Kitchen

The preparatory kitchen performs the following task

a. Checks incoming supplies of fresh vegetables after ensuring that the walk has been cleaned properly before stacking the new supplies
b. The racks should be clean properly removing the decayed material before arranging the fresh material
c. Checks all the requisition send by the main kitchen and other kitchen, makes the requisition ready and sends the same to the kitchen for mise en place.
d. Pre preparation of vegetable is been made as per the requirement of the various kitchen day to day working
e. Ensures that the extra vegetables are packed and stored in the walk in cooler
f. Prepares various pastes and masalas for Indian Food
g. Portion packs in bags and tags the various cuts of vegetables

1.6.2 Main Cooking Area

CONTINENTAL SECTION

The continental section of the main kitchen is divided into three sub section

Soup

Roast and sauce

Vegetables

Soup Section

In this section the following work is performed by the chef

- Prepares stocks for the soups(fish ,meat, chicken)
- Prepares basic soups such as consommé, puree, broth.
- Prepares speciality soups such as bisque, French onion soup, Shorba, Yakni, and soups on the menu.
- Preparation of all garnishes is as done here.

Roast and Sauce Section

The roast and sauce section performs the following work

- Prepares basic sauces such as demi-glace, béchamel, veloute, tomato sauce etc., and their derivatives.
- To cook meat, poultry and game as required such as grilling, roasting, stewing, and frying.
- To prepare all fishes and shellfishes such as frying, grilling, baking, etc.

Vegetable sections

The vegetable section performs the following function

- Prepares all kinds of vegetables and sauce
- Prepares all types of pasta, rice, noodles etc and their sauces
- Prepares all the vegetarian delicacies and specialty on the menu

BAKERY AND CONFECTIONERY

The bakery and confectionery performs the following functions

a) Prepares dough for various breads and rolls
b) Bakes various bread and rolls
c) Bakes all sweet yeast dough products such as Danish pastry, croissant ,doughnut ,brioche
d) Prepares sponge for cakes and gateaux
e) Prepares various icings and frostings
f) Prepares and decorate the cakes
g) Prepares pastries
h) Prepares various paste such as puff pastry, shortcrust, choux.
i) Prepares various puddings and desserts.
j) Prepares special ice creams and ice cream cakes
k) Prepares petit fours, cookies, mints and chocolates.
l) Prepares decorative centre pieces such as pulled sugar baskets, gum paste.

INDIAN SECTION

The Indian section is sub divided in three sections

1.Curry section

- To prepare various meat and chicken preparation
- To prepare cottage cheese and vegetable curries.
- To prepare lentils
- To prepare all types of rice preparation

2.Tandoor Section

- To prepare the marinades
- To prepare and make kababs
- To prepare dough for various Indian breads
- To bake the breads

3.Halwai section

- To prepare all types of Indian desserts
- To prepare all kind of snacks Indian
- To prepare all types of accompaniments

MEAT PROCESSING SECTION

The meat processing as performs the following functions

- Checks all in received meat and fish for quality , weight, freshness from the vendor
- Checks for proper storing of the items and hygiene and sanitation of the area
- Checks all the requisitions and delivers the same to the various kitchen for the working of the day.
- Checks all requisition made by the main kitchen and other kitchen for the following days and get the required material accordingly from the stores.
- Prepares the *Mise en place* required for the banquets, a la carte, and par stock.
- Portioning, packing, tagging and stacking the various cuts.

Check your progress – 9

1. What are the broad categories of sections in a professional kitchen?
2. What are the sections in Indian Section?
3. What are purposes that Preparatory Kitchen is expected to serve?

1.7 HIERARCHY OF KITCHEN DEPARTMENT

The professional kitchen involves a number of staff members. Depending on the volume of work at the kitchen, there may be few or large number of employees in the kitchen. They may be categorized according to the degree of specialized work they perform. There are unskilled or semiskilled personnel like porters or helpers, who may report to specialized cooks like cooks preparing soups, etc. These specialized cooks further report to the Executive Chef.

The executive Chef is overall in-charge of the Kitchen. He decides the various activities like food festivals depending on the special events taking place at the town. For example, during the Christmas festivities, the hotel or restaurant may decide to host Cake Festival where the restaurant may show-case the various types of cakes to attract people of various tastes. Such activities help in building the brand image of the hotel or restaurant. He also decides daily menus depending on the availability of the vegetables in the season and liking of the local customers in a specific season. For example, during a certain period, people of the town may have tradition of eating fishes of various types. The Executive Chef will prepare menus to take care of such demands.

We will learn about the various staff members, their roles and the attributes which they must possess in the following sections.

1.8 CLASSICAL KITCHEN BRIGADE

The workforce which works in the kitchen is called as KITCHEN BRIGADE. The chefs and his team play an important role in the working of the kitchen smoothly. The Executive chef is the head of the kitchen followed by other chefs. Each chef is specialized in his section and work.

Executive Chef → Sous Chef →

- Sauce Cook
- Roast Cook
- Fish Cook
- Grill Cook
- Vegetable Cook
- Soup Cook
- Larder →
  - →Cold Work
  - →Hors d'oeuvre
  - →Butcher
- Pastry Cook →
  - →Baker
  - →Ice Cream
- Indian Section→
  - →Tandoori
  - →Halwai
- Relief Cook
- Breakfast Cook
- Staff Cook
- Commis, Porter, Apprentices

1.10 DUTIES AND RESPONSIBILITIES OF VARIOUS CHEFS IN KITCHEN

1. **EXECUTIVE CHEF:** The executive chef performs the following responsibility.

    - Works with the policies, standards and service procedure of the department.
    - Responsible for maintenance and handling of equipments.
    - Estimates the needs of the guest and attends to them quickly.
    - Acquaints himself with all aspects, services and activities of the hotel to attend to the guest enquires.
    - Readdresses the grievances of the guest.
    - Observes the guest reaction and consults with the service staff.
    - Monitors and ensures cleanliness and sanitation in all kitchen areas.
    - Examines the routine operational activities; catering activity; forecast; purchases; house count; meetings; VIP's; appointments.
    - Responsible for regulating operational duties and asings tasks to staff members.
    - Communicates with the sous chef to incorporate changes in schedule.
    - Inspects daily physical inventory of specified food item.
    - Ensures that recipe cards, production schedules, platting guides and photographs are recent.
    - Monitors the performance of staff members.
    - Ensures that staff members maintain personal hygiene and abide the sanitation and health regulation.
    - Identifies the situation that tend to compromise the standard of the department
    - Communicates needs with purchasing and storeroom personnel and ensures that only quality products are received.
    - Ensures that each kitchen work area is stocked with adequate tools , supplies and equipments for the business
    - Responsible for ensuring that the staff prepares menu items
    - Maintains proper storage procedures, specified by the authority
    - Develops new menu items
    - Reviews the sales and food costs on a daily basis
    - Conducts annual performance appraisals of staff members
    - Conducts interviews and employs new personnel as per the standards of the hotel

2. **CHEF DE CUISINE**
    - The chef is responsible for the kitchen.
    - He acts as a cook and also looks after the administration.
    - He should be efficient ad capable of maintaining discipline.
    - He must be aware of the prices, commodities in seasons.
    - He organizes and supervises the work of the kitchen
    - He hires, trains and manages his staff

- The chef is responsible for the staffing of the kitchen and for the organization of duty rosters.
- The quality and presentation of food is one of the major concerns of the chef.

3. **SOUS CHEF**
    - He is assistant of the executive chef and second in command
    - He heads the operation of the kitchen
    - He assists the chef de cuisine in all his duties.
    - He is responsible for the functioning of the kitchen and also monitors the activities.
    - The sous chef prepares the duty roaster
    - He also prepares an order for food products to be purchased, for day to day requirement.

CHEF DE PARTIE

- Chef de partie heads a particular section of the kitchen and is responsible for managing his section of the kitchen.
- Chef de partie is assisted by a commis, cook and trainees in the kitchen
- In long working hours, the working period is split between the chef the partie and the first commis.

CHEF SAUCIER

- The position of chef saucier is the highest amongst the station cooks
- He is regarded as an important cook as he carries out the complex task of preparing sauce for meat, poultry and entrees.
- He prepares these sauces keeping in mind that the sauces are distinctive in taste bt not overpowering.

CHEF ROTISSEUR (ROAST COOK)

- The chef rotisseur supervises that section of the kitchen in which roasting and grilling is carried out.
- He is responsible for preparing braised roasts and grills of meat and poultry and the accompanying sauces and garnishes.

CHEF POISSONER (FISH COOK)

- The fish cook is responsible for preparing all the fish entrees.
- He gets the raw fish in required quantities and cooks, garnishes and sauces the fish dishes.

- The repertoire of fish dishes, their cooking method and handling is an art and extensive training and judgement are required from the chef

CHEF POTAGE

- The soup cook is responsible for preparing all types of soups and the accompanying garnishes.

CHEF GARDE MANGER (LARDER COOK)

- The larder cook holds a important position in an establishment
- He prepares the food that is processed for the main kitchen
- He also supplies food item to the cold buffet which is a storehouse for items such as fruits, salad.
- He carries out a number of responsibilities as he supervises various subsections such as salad section, hors d oeuvre and the butchery

CHEF ENTREMETTIER (VEGETABLE COOK)

- The vegetable cook prepares all the vegetable dishes.
- He is responsible for preparing all the vegetable accompaniments which are served with other main course

CHEF PATISSIEUR(PASTRY COOK)

- The pastry cook is responsible for making pastries, breads, cakes and other baked products
- He also ensures the regular supply of raw material for the production of pastries
- He is responsible for serving the dishes in a unique and decorative manner.

CHEF DE BANQUET(BANQUET COOK)

- The brigade comprises of a banquet chef and chef de parties who are
- Assisted by commis
- The banquet chef coordinates with the chef de parties on the number of dishes supplied to the service point
- He makes arrangement for the point
- The completion of semi-finished
- dishes at the service
- The banquet chef works in collaboration with the banqueting manager and deals with issues pertaining to the service and special dishes required

CHEF TOURANT (RELIEF COOK)

- The chef tourant relieves other chefs or cook in the work area.
- He does not carry out any specific responsibilities but plays the role of a substitute chef
- He should be capable of running all station of the kitchen
- He is skilled and has knowledge of all the stations of the kitchen.

CHEF DE PETIT DE JEUNER (BREAKFAST CHEF)

- The breakfast cook starts his work early in the morning as he is responsible for the complete breakfast service.
- He must be a skilled in his work
- He makes arrangement for the meals served in the breakfast
- He also helps the soup and the vegetable cook in their work

CHEF COMMUNAR (STAFF COOK)

- The food for the staff is prepared by a number of chefs de partie, of large hotel, this is the responsibility of a separate section.
- The section comprises of the staff cooks who cook food for the lower and supervisory staff.

KITCHEN PORTERS

- The kitchen responsible for managing the issue and collection of laundry from the kitchen personnel.
- The kitchen stewarding department looks after the pots and pans, which are no longer a apart of the kitchen in large establishments

COMMIS

- A commis is an apprentice in kitchen who works under a chef de partie to learn the station responsibilities and operation.
- This may be a chef who has recently completed formal culinary training or is still undergoing training
- The designation of a commis varies from commis I, II, III.

Check your progress – 11

1. What is the hierarchy of various chefs working in a kitchen?
2. Draw a diagram showing the line of command for the various chefs working in a professional kitchen?
3. What are the responsibilities of the Executive Chef?

1.11 ATTRIBUTES OF VARIOUS CHEFS

1.11.1 EXECUTIVE CHEF:

1. Being the overall in-charge of the kitchen, he is the key person, who can make or break image of the professional kitchen.
2. He should have thorough knowledge of the art of cuisine, local customs, local culture.
3. He should have the leadership skills to raise the moral of the team, unassailable character not to compromise with the standards of the hotel, ability to assess the stated and perceived needs of the customers and how to exceed and meet them
4. He should have the managerial skills of planning, cost-consciousness, time management, resource management, maintaining safety and sanitation ned etc
5. He should have the courage and communication skill to report to the Hotel or Restaurant top Management about the status and directions of the kitchen, its needs, opportunities which may be cashed, and how the branding of the establishment could be enhanced. Estimates the needs of the guest and attends to them quickly.
6. As with everyone in the hospitality industry, he too should have a pleasing personality and presence of mind.

1.11.2 CHEF DE CUISINE

1. He should have the knowledge, skill and attitude for a good cook.
2. He should have the managerial abilities to plan, audit, supervise the kitchen and maintain order here.
3. He should have leadership qualities to maintain discipline and order in the kitchen.
4. He should have the human resource management skills of training, hiring and supervising the staff.
5. He should have sufficient communication skills to lead the staff to understand their problems and issues and communicate the unresolved ones to the higher management.
6. As with everyone in the hospitality industry, he too should have a pleasing personality and presence of mind.

1.11.3 SOUS CHEF

1. Being the second in command, he should have all the qualities of the Executive Chef.
2. He should be aware of the facts at the topmost level, so that the operations run smoothly even in the absence of the Executive Chef.
3. He should communicate with the Executive Chef, all the issues and problems related to the staff, raw material, and all the related matters.
4. He should be able to resolve the matters at his level where possible.
5. He should have managerial skills for preparing duty roster, costing the dishes in the menu, purchasing of the raw material, equipement, etc.

6. He should have leadership skills to maintain cordial atmosphere at the workplace, making every staff member feel comfortably enjoying the job assigned to him/her at the same time maintaining the decorum and discipline.

1.11.4 CHEF DE PARTIE

Being head of particular section of kitchen, he should understand the demand of the section. He should have through knowledge of cooking, particularly for the section he heads. He should have the leadership qualities to plan activities which brings out the best from the section. He should have creative skills to generate ideas in menu planning, workflow management, etc. He should have management skills to plan and coordinate all the activities in the section of the kitchen.

1.11.5 CHEF SAUCIER

He should have thorough knowledge and skill for preparing sauce for meat, poultry and entrees. He should have skills to examine the quality of the raw material and report to the concerned supervisor any problems in the quality of the raw material or equipments, etc.

1.11.6 CHEF ROTISSEUR (ROAST COOK)

He should have thorough knowledge and skill for preparing braised roasts and grills of meat and poultry and the accompanying sauces and garnishes. He should have skills to examine the quality of the raw material and report to the concerned supervisor any problems in the quality of the raw material or equipments, etc.

1.11.7 CHEF POISSONER (FISH COOK)

He should have thorough knowledge and skill for preparing all the fish entrees. He should have skills to examine the quality of the raw material and report to the concerned supervisor any problems in the quality of the raw material or equipments, etc.

1.11.8 CHEF POTAGE

He should have thorough knowledge and skill for preparing all the soups and garnishes. He should have skills to examine the quality of the raw material and report to the concerned supervisor any problems in the quality of the raw material or equipments, etc.

1.11.9 CHEF GARDE MANGER (LARDER COOK)

He should have thorough knowledge and skill for preparing all the food that is processed for the main kitchen. He should have necessary skills to supervise subsections like butchery, hors d'oeuvre and salad and managerial skills to oversee the supply of food items to cold buffet. He should have skills to examine the quality of the raw material and report to the concerned supervisor any problems in the quality of the raw material or equipments, etc.

1.11.10 CHEF ENTREMETTIER (VEGETABLE COOK)

He should have thorough knowledge and skill for preparing all the vegetable accompaniments which are served with other main course. He should have skills to examine the quality of the raw material and report to the concerned supervisor any problems in the quality of the raw material or equipments, etc.

1.11.11 CHEF PATISSIEUR (PASTRY COOK)

He should have thorough knowledge and skill for preparing all pastries, breads, cakes and other baked products. He should have skills to examine the quality of the raw material and report to the concerned supervisor any problems in the quality of the raw material or equipments, etc. He should have the creative skill to present the items in aesthetically pleasing manner.

1.12 COORDINATION OF KITCHEN WITH OTHER DEPARTMENTS

Coordination of kitchen takes place at various levels. The kitchen staffs coordinates with the four important departments of the hotel- Front office, food and beverage, house keeping and maintenance.

- Coordination with the food and beverage department: The kitchen department must work in coordination with this department as the food is prepared in the kitchen and consumed by the guest in the restaurant, bar and coffee shop. Food is prepared for various outlets and the F and B department should coordinate with KOT's with each section of the kitchen.

- Coordination with house keeping: The house keeping department takes care of the overall cleanliness and maintenance in the kitchen premises. It also issues and receives dirty uniforms and napkins and gives fresh uniforms and napkins.

- Coordination with the maintenance department: The kitchen works in close coordination with the maintenance department for any repairs and maintenance of the kitchen equipment.

- Coordination with the front office: The kitchen coordinates with the front office to know the house count. It helps the kitchen in preplanning and ordering the raw material in the kitchen.

- Coordination with the store: Coordination with the store and the kitchen is necessary. The store provides the ingredients required for the preparation of food. All raw materials are collected by the kitchen staff from the store.

- Coordination with the Human resource department: The kitchen Coordinates with the human resource department for training and recruitment of staff and dismissal or leaves of the staff.

1.13 SUMMARY

- The purpose of kitchen organization is to produce high standard and good quality food for the required number of people, on time, by efficiently using staff, equipment and materials.

- It has been observed that dividing the work of the kitchen into 'parties' or 'corners' gives good results in terms of productivity and efficiency. This system was started by George Auguste Escoffier, a French chef who organised his kitchen in hierarchical sections, with each section by a party chief.

- The various section of a large kitchen includes the meat processing area, preparatory kitchen, continental section, bakery and confectionary and the Indian section.

- The executive chef is responsible for looking after the kitchen and kitchen personnel. He is also accountable for ensuring quality preparation of all menu items and proper handling and storage of all food items in accordance with thestandard of the establishment.

- The chef the cuisine is responsible for the kitchen. He acts as a cook and as looks after the administration.

- The sauce chef is the assistant of the executive chef and is second in command. However, in some hotels, he also heads a kitchen.

- The chef de partie heads a particular section of the kitchen and is responsible for managing his section of the kitchen. Each chef de partie is assist by a commis, cooks and trainees in the kitchen.

- The kitchen staffs coordinates with the four important departments of the hotels- front office, food & beverage, housekeeping and food production.

1.14 END QUESTIONS

The following questions should help you prepare for the End Examinations. These questions are for 5 marks each and should take you 11 minutes under examination conditions.

1. Describe a professional kitchen
2. Explain the importance of kitchen
3. Describe ways to maintain the professional hygiene

4. What are the various sources of food spoilage?
5. How can we control the growth of bacteria?
6. Explain what is meant by Professional uniform.
7. What are the various considerations to be kept in mind while designing uniforms>
8. What are the various parts of a professional kitchen?
9. Explain classical kitchen brigade.
10. Describe the functions of the various chefs.
11. Describe what attributes the various chefs should possess to meet the professional needs
12. Explain how kitchen coordinates with the other staffs in hotel.

1.15 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress -1 (B),

Check Your Progress -2 (D),

1.15 REFERENCES

1. " Principle of cookery" by Mousumi Dasgupta (Published by Vikas Publication, Delhi for YCMOU)

2. "Training Manual for Food Preparation " by Sudhir Andrew, Tata Mc Graw Hill, Delhi

3. Wikipedia, "Uniform of Chef"

UNIT 2 KITCHEN EQUIPMENTS, FUEL AND SAFETY

Structure:

2.0 BEFORE WE BEGIN

We have learned about the layout of the professional kitchen in the previous unit. We have seen what are the designation, duties, responsibilities and desirable attributes of the various staff of the professional kitchen. We also saw the precautions to be taken by the kitchen staff for maintaining kitchen hygiene at the personal level and at the place of work. We saw how the spoilage could be controlled by the various means. Thus, we have got ourselves accustomed with the place of our work for food production.

We now move on and would like to get introduced with the other players in the kitchen, namely our kitchen equipments. We would learn how to categorize and use them. We would learn how to use them safely. But despite our best efforts, if accidents do take place, we aught to know how to take care of the burns, cuts and other problems. Thus this unit, builds up on the previous knowledge and is important for every one who is to take the first steps in the kitchen. We will, in the rest of this course would learn how to prepare the food in the kitchen. However, before we prepare our first recipe, we should know how to handle kitchen equipments safely and effectively. This unit is going to ensure that.

2.1 UNIT OBJECTIVES:

After studying this unit you will be able to

- ✓ Describe what is meant by kitchen equipments
- ✓ Classify the kitchen equipments

- ✓ Describe various types of kitchen equipments
- ✓ Explain how the various kitchen equipments are used
- ✓ Explain how various kitchen equipments are maintained and stored
- ✓ Describe the kitchen tools
- ✓ Describe various types of knives used in professional kitchens
- ✓ Explain how various types of knives are maintained
- ✓ Describe what is meant by workstations
- ✓ Describe various safety procedures used in a kitchen
- ✓ Explain various types of fuel
- ✓ Explain how various types of fuel are used
- ✓ Describe the safety measures to be taken up in use of various types of fuel
- ✓ Describe the various types of fires and how they are to be handled
- ✓ Describe various types of fire extinguishers
- ✓ Explain the first aid processes for burns
- ✓ Discuss how the cuts in accidents at kitchen are to be handled.

2.2 KITCHEN EQUIPEMENTS

Various types of equipments and machinery are used in a professional kitchen. They may be classified according to their sizes (small, medium, large), their purpose (cooking, storage, cooling and preservation, measurement, etc).

We will study the classification, use and description of these equipments in the following section.

2.3 CLASSIFICATION, DESCRIPTION AND USE OF KITCHEN EQUIPMENTS

The following are the various types of equipment used in commercial and domestic kitchen.

2.3.1 COOKING EQUIPMENTS

The following are some of the cooking equipments

STEAMERS

The following are two main types of steaming oven.

Atmospheric steaming oven

Pressure less steaming ovens

Combination steam ovens; like Pressure convention steam ovens, pressure less or fully pressurized steam ovens, combination of steam air and hot air. The modern combination steamers are equipped with electronic controls are précised in time and temperature. Electronic controls are beneficial as they are able to control the fuel efficiency. Steamers are used for steaming, poaching, stewing, braising, baking, vacuum cooking, blanching, reconstituting, and defrosting.

BRATT PANS

A multi purpose cooking equipment, a bratt pan can be used for shallow frying, deep frying, stewing, braising, and boiling. It can be used to cook many food items at a time because of its large surface area. Another advantage is that they can be tilted so that the content can be quickly poured out after being cooked. Bratt pans are heated using gas or electricity.

BOILING PANS

Boiling pans are usually made of metal such as aluminium, stain less steel etc. And they can be heated with the help of electricity or gas. These are generally used for boiling or stewing large quantities of food. They do not allow the food to burn. The steam- jacket type boiler is the most suitable.

PASTA COOKER

This equipment has water delivery and drains taps andcan be used for cooking several types of pastas simultaneously. It is electrically operated.

DEEP FAT FRYERS

A deep fat fryer is commonly used in the catering industry. This equipment should used cautiously as its misuse can result in spilling of food and fat. Fryers are equipped with a thermostatic control which saves fuel ad fat, and prevents over heating. They are heated with help of gas or electricity

PRESSURE FRYERS

Food is cooked in an air tight frying vat which helps in frying the food lot faster at a low point temperature. Pressure fryers are commonly used in industrial kitchen.

HOT AIR ROTARY FRYERS

These are designed to cook batches of frozen blanched chips or battered food items without any oil in four to six minutes.

STEAM JACKET KETTLE

Various types of steam jacket kettles are available in different metals and sizes. These can be heated with the help of gas,electricity or steam from the main supply. Most of these are equipped with a tilting device to help empty the content easily.

HIGH PRESSURE BURNER RANGE

This equipment gives out intense heat and can be regulated and food can be cooked be used should be heavy in large quantities. The bottom of the pots and pans to

GRILLS AND SALAMANDERS

Salamanders or grills are heated from above by gas or electricity.These are often allowed to burn unnecessarily for long periods of time.Most salamanders have more than one set of heating elements or jets and it is not always necessary to have them all turned on fully.

CONTACT GRILLS

These are sometimes referred to as double side and two heating surfaces arranged, facing each other. The food to be cooked is placed on one surface and is then placed on one surface and is then covered by the second. Griddle with zone heating are useful as a portion of griddle can be heated without heating up the entire griddle.

FRY PLATES, GRIDDLE PLATES

These are solid metal plates heated from below and are used for cooking individual portions of meat, hamburgers, eggs, bacon, etc. They can be heated quickly to high temperature and are suitable for rapid and continuous cooking. Griddles with zone heating are useful as a portion of griddle can be heated without heating up the entire griddle.

BARBEQUES

Barbeques are becoming increasingly popular because they facilitate easy and quick cooking. There are three main types of barbeques- traditional charcoal, gas, and electric barbeque. Charcoal-fire type barbeque takes about an hour before the surface is ready to cook. In case of gas and electricity barbeque food can be cooked immediately. Gas is more flexible and controllable than electricity.

BAKING SHEETS

They are used in oven for baking; they are made up of aluminium or black metal. They are used for baking various cookies and bakery products.

2.3.2 STORAGE EQUIPMENT

The following are some of the storage equipment

- ***HOT CUPBOARDS***

  It is commonly known as HOT PLATE, hot cupboards are used for heating plates and serving dishes and for keeping food hot. It is necessary to maintain the amount of heat fed into the hot cupboard to be controlled; otherwise the plates and food will either be too hot or too cold.

- ***BAIN MARIE***

  A brain Marie has open wells of water used for keeping food hot, and it is important that the brain Marie contains sufficient heat to boil the water.

- ***STORAGE RACKS***
  These are commonly used in commercial and domestic kitchens for storing various food items. Both mobile and stationery racks are designed to accommodate a number of food items.

- ***COFFEE AND MILK HEATERS***
  Water jacket boilers are equipped with draw off taps from the storage chamber and used to store hot coffee and hot milk. This equipment can be made up of glaze earthenware, stainless steel or heat resistant glass.

2.3.3. CLEANING EQUIPMENT
The following are some of the cleaning equipment

- ***DISHWASHING MACHINES***
  For hygienic washing, the general requirement are a good supply of hot water at a temperature of 60 degree Celsius for general cleansing, followed by sterilizing rinse at a temperature of 82 degree Celsius for 1 minute. Alternatively low temperature equipment is available that chemically sterilizes utensils.

- ***BOILERS***
  Boilers refer to water boiling appliances used for making tea and coffee. They can be of three types:

  - ***BULK BOILER:***
    These are generally used when large amount of boiling water is required at a given time. They should be kept clean, covered with a lid to prevent anything from falling in. When not in use, they should be left filled with clean water for some time.

  - ***AUTOMATIC BROILER:***
    These boilers have automatic water feeds and can give freshly boiled water at intervals. It is important that the water supply is maintained efficiently, otherwise there is a danger of the boiler burning dry and being damaged.

  - ***PRESSURE BOILER:***
    These boilers include steam heating milk boilers and a pressure boiler which provides boiling water. Especially attention should be given to the pilot light to see that it is working efficiently.

2.3.4 MEDIUM EQUIPMENT

2.3.4.1 Cooking equipment
The following are some of the commonly used cooking equipment:

(i)Stoves
Various types of stoves are available which use fuel, gas and electricity. The top of the stove should be cleaned pad. When cool, the stove can be cleaned more thoroughly by washing and

using an abrasive such as emery paper. Light greasing of the slid top is essential after cleaning. In case of an open type of stove, all the bars and racks should be removed, immersed in hot water with a detergent, scrubbed clean, dried and put back in place on the stove. After this, all gas jets should be lit to check it they are blocked. All enamel parts of the stove should be cleaned using detergent water, rinsed and dried.

If a lot of dirt grease is struck o to the stove oven, a caustic jelly can be used to remove it, though proper rinsing must take place after this, unnecessary lighting or lighting of stoves too early should be avoided as it can cause wastage of fuel.

(ii)Ovens and ranges

Various types of ovens are operated by electricity, gas, fuel or oil. Nowadays, microwave and microwave plus convention ovens are also available.

(iii) Convection Ovens

In convention ovens, a circulating hot air current is forced around the inside of the oven by a motorized fan or blower. This results in a constant and more even temperature, which facilitates cooking of food. Due to this, food can be cooked at lower temperatures and that too within a short period of time, thereby saving fuel.

Forced air convection can be characterized as fast conventional cooking as heat is applied to the surface of the food at a fast pace, since moving air transfers its heat more rapidly as compared to static air. In a sealed oven, fast hot air circulation reduces evaporation loss by minimizing the shrinkage and it brings about a rapid change in the surface in the surface texture and colour, which are traditionally associated with certain cooking processes.

The following are the four types of the convention ovens:

Convention ovens in which forced air circulation is accomplished within the oven, by means of a motor-driven fan. The rapid air circulation ensures even temperature distribution to all parts of the oven.

Convention ovens in which low-velocity and high-volume air movement is provided by a power blower and duct system.

A combination of a standard oven and a forced convection oven, which is designed to operate either of them by the flick of a switch.

A single roll-in rack convection oven with heating element and fan placed outside the cooking area.

(iv) COMBINATION OVENS

Combination ovens have brought about a revolution in baking, roasting and steaming. There are many varieties of combination ovens which are available in market, such as ovens fuelled by gas or electricity. These are extensively used in most sectors of the catering industry and also in large banqueting operations. These are pre-programmed and offer ideal producers for cooking

different meats, especially roasts such as leg of lamp and roast pork. The special feature of a combination oven is that it automatically detects the size of the meat and volume of the food in the cooking cabinet.
An oven can be easily programmed to produce exact cooking time and to reheat chilled food, thereby allowing the chef to produce consistence products every time. The following are the special features of combination ovens:

- They reduce cooking time.
- They are fully automatic and help achieve the desired browning levels and exact core temperatures.
- They are equipped with an automatic cleaning device.
- A combination oven system allows more food to be produced in less space.
- They provide efficiency in terms of energy.
- They offer increased productivity.

(v) HOLD OVENS
Hold ovens reduce labour and product shrinkage, provide product consistency and increase the holding life for banqueting service. In these ovens, two items are available, one for holding and serving and the other one for regeneration and serving.

(vi)SMOKING OVENS
Smoking certain food items is a means of cooking by injecting a smoky flavour and preventing it. These ovens or cabinets are well insulated with controlled heating elements on which wood chips are placed. As the wood chips burn, the heated smoke permeates food such as fish, chicken, sausages, etc. Which are suspended in the cabinet.

(vii)MICROWAVE OVENS
Microwave cooking is a method of cooking and heating food by using high-frequency power. The energy used is the same as that which carries the television signal from the transmitter to the receiver, though it is at a higher frequency.

The waves disturb the molecules or food particles and agitate them, thus causing friction, which has the effect of heating the food. In the conventional method of cooking, heat penetrates the food only by conduction from the outside, whereas, food cooked by microwave needs no container before being put in the oven. Metal is not used in microwave ovens as the microwaves are reflected by it.

The oven cavity has metallic walls, ceiling and floor, which reflect the microwaves. The oven door is fitted with special seals to ensure that there is minimum microwave leakage. A cut-out device automatically switches off the microwave energy when the door is opened.

(viii)COMBINATION CONVECTION AND MICROWAVE COOKER

This cooker combines convection and microwave, thereby giving advantages such as speed, enhanced colour and texture of food. Traditional metal cooking pans may also be used without fear of damage to the cooker.

(ix) INDUCTION COOKING HOBS

In induction cooking hobs, heat is generated in the cooking pan itself. In conventional methods of cooking, energy is used to heat a source, which in turn heats the cooking vessel. In case of induction hobs, the pan becomes the source of heat and this is why induction cooking can be carried out only with the help of an induction pan placed on the induction plate. There is no visible light that gets transferred.

(x)HALOGEN HOBS

Halogen hobs run on electricity and comprises of five individually controlled heat zones, each of which has four tangents halogen lamps located under a smooth ceramic glass surface. The heat source glows red on being switched on and gets brighter as the temperature increases. When the hob is switched on, 70 per cent of the heat is transmitted as infra-red light directly into the base of the cooking pan and the rest is from conducted heat through the ceramic glass.

2.3.4.2 MECHANICAL EQUIPMENT

Mechanical equipment is commonly used in kitchens as they work efficiently and save labour and time. As machines are not subject to human variations, the performance of most machines can be closely controlled. Due to this, it also becomes easier to obtain uniformity of production over a period of time.

When some new equipment is installed, it should be tested by a qualified person before being used by the catering staff. The manufacturer's instructions must be considered while using it. The following are some of the commonly used mechanical equipment:

(I)Power driven machines

The following equipment is included in the category:

- Worm-type mincing machines
- Pie and tart making machines
- Rotary knife, bowl-type chopping machines and dough mixers.
- Food mixing machine used for mincing, slicing, chipping or for crumbling
- Vegetables machines

(II)Potato peelers

Both manual and electric potato peelers are used in kitchens. These types of equipment also require proper care and maintenance. It should be ensured that potatoes are free of dirt before loading them in the machine. The inside of the machine must be cleaned after each use and the abrasive plate must be removed to ensure that food particles are not lodged below it. The peel trap should be emptied as often as required and the waste outlet should be kept free from obstruction.

3 .Food processing equipment

Food mixer
This is an important and labour-saving, electrically-operated equipment used for various purposes such as mixing pastries, cakes, mashing potatoes, mincing or chopping meat and vegetables, beating egg whites, mayonnaise cream, etc.

Liquidizer or Blender
A blender is a labour-saving piece of kitchen machinery that uses a high-speed motor to drive stainless steel blades to chop, puree or blend foods efficiently and quickly. It is also useful for making breadcrumb. As a safety precaution, food items must be cooled before being liquidized.

Food slicer
Food slicer are available both in manually and electrically-operated versions. They are labour-saving devices and should be placed in a prominent position near the machine. The following are some general precautions to be kept in mind while using food slicers. Care should be taken that no material which is likely to damage the blades is included in the food to be sliced. It is easy for a careless worker to overlook a piece of bone which, if allowed to come into contact with the cutting blade, can cause severe damage.

Each section in contact with food should be lubricated, but the oil used for this purpose must not come into contact with the food. Care should be taken while handling and exposing blades.

Chopper

A chopper is commonly used in kitchens for chopping vegetables and meats. It is available in electric and manually operated versions. The electric chopper should be thoroughly cleaned and dried after use and particular attentions should be paid to those parts that come into direct contact with food. It should be ensured that no obstruction prevents the motor from operating at its normal speed. Moving parts should be lubricated according to the manufacturer's instructions.

Masher

Masher is used to crush soft food items, such as potatoes. These are available in both electrically and manually operated versions. A hand based masher must be washed immediately after use, followed by rinsing and drying. In case of an electric masher, the removable parts and the machine should be separately washed and dried. Parts that come into direct contact with food should be handled with extra care.

Ice cream maker, juices and mixers

Ice cream and sorbet machines have minimum one litre capacity and enable establishments to produce home-made ice cream and sorbet using fresh fruits in season and canned fruits at all times of the year. Juicers and mixers can provide freshly made fruit and vegetable juices, milk shakes and cocktails.

2.3.5 Small Equipment and Utensils

2.3.5.1.Basic cutting tools

The following are the basic cutting tools required in every large kitchen:

(i)Knives

A good set of knives may be expensive but is an investment for a lifetime. The performance of a knife depends on two features—the quality of its steel and the excellence of its grind. The carbon content in a knife determines the hardness of its blades, which is essential for a sharp edge. A carbon steel knife will retain its sharp edge but it tends to react and turn black and will also rust if not dried properly after washing. On the other hand, stainless steel is a blend of carbon steel is a blend of carbon steel and chromium and does not mark or rust. However, because of the carbon content, stainless steel knives do not have a very sharp edge for a long time. It takes as much effort to keep a carbon steel knife clean as it takes to keep a stainless steel knife sharp. While selecting knives, designs should be considered as all knives are designed for specific purposes.

(ii) Butcher or Chopping Blocks

Chopping blocks are thick and durable wooden blocks which are primarily used for heavy chopping. These blocks have a tough surface and can therefore, withstand repeated heavy blows. They are used for cutting tough meats, especially in butcher shops.

A scraper should be used to keep the blocks clean. After scraping, the block should be sprinkled with common salt in order to absorb any moisture that may have penetrated during its use. Water or liquids should not be used for cleaning unless absolutely necessary, as wood may absorb water and cause swelling.

(iii) Cutting Boards or Chopping Boards

These boards are used to place foods to be cut on them. These are usually kept on table surfaces to protect the table from the edges of knives. Wooden cutting boards are commonly used in kitchens, though plastic and rubber cutting boards are also available.

2.3.5.2 Cooking equipment

The following are the cooking equipments required in every large kitchen:

(i)Pots and Pans

A standard commercial kitchen would have cooking utensils for specific uses, such as an omelette pan, a fry pan and a range of stainless steel pots of different sizes. While purchasing pots and pans, quality should be taken into consideration. It is better to buy a thick copper-based pan with a riveted handle than a thin and cheaper version that will dent, break or develop hot-spots. It should be ensured that pots have sturdy insulated handles and straight sides that curve gently at the base, so that there are no corners which are inaccessible to a spoon or whisky. The most commonly used top accessories are as follows:

(ii) Rolling pins, wooden spoons and spatulas

Rolling pins are cylindrical in shape and are primarily used to flatten dough. Generally, wooden rolling pins are used in kitchens. However, rolling pins made of glass and plastic are also available. These should be scrubbed in hot detergent water, rinsed in clean water and dried. They should never be scraped with a knife as this can cause the wood to splinter. Adhering pins cab be removed with a plastic capable of withstanding high temperatures. Wooden spoons and spatulas are commonly used while cooking in non-stick pans. These are considered unhygienic unless washed in a suitable sterilizing solution such as sodium hypo chloride solution (bleach) or Milton solution.

(iii) Wooden sieves and mandolins

Sieves are commonly used in kitchen for straining soups and other liquids. They are usually made of wood, though plastic sieves are also available. Mandolins are sharp instruments used for slicing of fruits and vegetables. While cleaning these, wooden frames should be washed in sterilizing solution. The blades of the mandolin should be kept lightly greased to prevent rust. Stainless-steel mandolins with protective guards are also available.

2.3.5.3. Crockery:

China and earthenware

Chinaware bowls and dishes are used for serving and are also used for placing dishes in microwave ovens. These should be cleaned in a dishwasher with a mild detergent and rinsed. They can also be washed by hand using an appropriate detergent.

REFRIGERATORS:

Refrigerators play an important role in the function of the garde manger as perishable food is stored at low temperature to prevent deterioration in the food and prevent growth of harmful bacteria.

Refrigerators should not be kept at deep freezing point that is 0-1 degree Celsius. A temperature of around 2-3 degrees is desirable. An effort must be made to keep the temperature constant. Following principles must be observed:

- The refrigerator should be in good working order.
- Check the thermostat to make sure it is functioning; have the refrigerator service regularly.
- Deep frost regularly to enable the evaporator to function efficiently.
- Use the door as little as possible and never leave it open longer than is necessary for keeping or withdrawing the food from the refrigerator.
- Never place hot food in the refrigerator as it will rise the temperature and is harmful to the other food and cold storage.
- When the refrigerator is being deep frosted it should be thoroughly cleaned.
- The racks and bar should be scrubbed with water and detergent.
- The wall door and floor of the refrigerator should be washed and sponged.

MINCING MACHINE AND BOWL CUTTER:

Mincing machine and bowl cutter is a combination machine. It is used for a number of functions in the *garde manger* like, mincing of meat for sausages, meat loafs, galantine, farce, mincing and chopping of cooked or raw food for various larder preparations.

The bowl cutter chops the food and useful for sausage meat, the mincer is used for breaking down bread and crust into bread crumbs which have been dried. The bowl cutter can be used for crumbing fresh crust less bread into crumbs. It can also be used for chopping vegetables.
Both the mincing and the bowl cutting attachment can be dismantled for cleaning which can be done with hot water containing detergent rinsed before reassembling. The machine should be lubricated at regular intervals.

SLICING MACHINE

The slicing machine is used for cutting slices of cooked meat such as ham, other joint of meat which is bone less. It is used for uncooked bacon rashers. A calibrated scale is fitted to determine the thickness of the slice. They may be manual, semi-automatic or fully automatic. For cleaning the machine should be dismantled and all parts washed in hot water and detergent. They should

be rinsed before reassembling. The blades should be cleaned with cotton based and wooden palette. The machine should be kept lubricated.

SCALES AND WEIGHING MACHINE

Scales and weighing machine are of several types. Large platform scales are used for weighing large joints of meat and heavy weight. For lesser weights there are smaller scales such as graduated scales. No maintenance is required other than cleaning the scale.

When being weighed, food should not be placed directly on the platform or pans of the scales, a clean dish, a grease proof paper should be used.

ELECTRIC GRINDING MACHINE

Electric grinding machine is used for sharpening the blunt edges of knifes and choppers. The following instructions should be carefully observed:

- Make sure there is sufficient water in the well and is pumped on the grind stone before using it. Never use the stone when it is dry.
- Use the guides fitted to the machine for either knives or choppers.
- Hold the handles of the knife in the right hand and draw the edge along the stone from the heel of the knife to the tip, with the stone moving in forward position and repeat the procedure with left side.
- Keep the machine in a clean condition by sponging it and drying it.
- Lubricate the machine with oil as per instructions.

BOILING PLATE OR GAS RINGS

Boiling plates or gas rings are used to heat or cook food, cooking vegetables for horsdoeuvre for rendering fat, for making jelly, sauce, pickles and other larder preparation. The flames must be controlled all the time to avoid burning of food. Spilling or boil over's should be wiped clean to prevent them from baking hard on the hot surface. The bar should be washed with hot water and detergent. The burners are required to be cleaned with hot water and detergent and wiped periodically. The fat drip tray must be emptied and cleaned daily. Do not allow crumbs to burn in the tray.

GAS BOILERS

The gas boilers are used for cooking large joints such as hams gammons and also for cooking lobster or crabs. The inner pans must be emptied, cleaned, washed and dried whenever used.

BUTCHERS BLOCKS

The butchers blocks are used for all butchery work including dissecting, jointing and cutting meat as well as cutting fats breaking and chopping bones. They are composed by joining a number of timber blocks framed around with a wooden frame. These butcher blocks are reversible that is, if one side is worn out it could be turned to use the other side. The surface should always be kept clean and dry. The top should never be scrubbed. It should be scrapped or brushed with the scraper or wire brushes provided and left to dry. Never wash the tools on the blocks.

STEEL TABLES

Steel tables are used as work benches but food must not be cut on them as it may create scratches on the work table and also make the edge of the knife blunt. The table should be cleaned with hot water with detergent and then rinsed with clean water and dried.

SAUCE PANS AND LIDS

Sauce pans and lids are made of aluminium. Certain food items cause discolouration of aluminium. The sauce pan should be washed in hot soupy water, polished to a bright sine with wire wool and soup. Soda must not be used for cleaning. Enamel trays are washed in hot soupy water rinsed and dried.

FRYING KETTLES AND FRYING PANS

The frying kettles are used for deep frying and rendering fats in drippings. The frying pans are used for a variety of shallow frying or sautéing. They are made up of steel and cleaned with a dry cloth.

KNIVES, CHOPPERS AND SAUCE

Knives choppers and sauce are made up of tempered steel and should be cleaned with detergent, hot water, rinsing and drying.

TOOL	USE
Butchers boning knives	Jointing and boning
Butchers steak knives	Cutting meat
Butchers saw	For surface ones
Butchers choppers	Chopping bones

Butchers chopping knives	Chining joints
Cooks 30cms knives	Poultry
Cooks 20-24cm knives	Vegetables
Cooks 6-8cm knives	Turning
Cooks 14-20cm filleting knives	Fish filleting
Palette knives	Lifting or turning food
Peeler	Peeling vegetables
Mandoline	Slicing vegetables

WOODEN UTENSILES

Wooden spatulas and spoons are used for stirring food and prevent burning. Wooden mushrooms are used for pressing food through sieves. These wooden utensils should be well scrubbed, washed, rinsed, and dried.

SMALL LARDER EQUIPMENTS

TOOLS	**USE**
Serving spoons and ladles	Spooning or ladling food
Sieves	Sieving various food item
Colanders	Draining food
Conical strainer and chinois	Straining sauce
Meat presses	Pressing joins
Pie moulds	Veal, pork, hams pie
Whisk	Whisking and stirring food
Egg slicer	Slicing hard boiled eggs
Graters	Grating food
Cutlet bat	Flattening cuts of meat
Trussing needle	Trussing poultry
Larding needles	Larding cuts of meat and poultry
Larding pin	Larding joints

Lemon zesters	Scrapping of lemon peal
Lemon decorators	Channelling lemon skin
Vegetable scoop	Shaping vegetables and potatoes
Skewers	Skewering meat
Brining syringe	Pumping brine into joints
Brinometer	Measuring density of brine

2.4 UPKEEP AND STORAGE

2.4.1 Upkeep of Equipment

An increase in demand for quick food preparation and production in most food services areas has resulted in an increase in the number of machines. Nevertheless, machines can cause severe injuries, from a minor cut to a crushed limb. Thus, machines should not be operated until and unless one is instructed about their proper use. The following factors should be considered while using machines:

- Machines should be in proper working order.
- The operator should be trained to use the equipment.
- Attachments should be correctly assembled and the correct equipment should be used to operate the machine.
- Hands should be never placed inside the machine while it is in motion.
- Power should be switched off and plugs removed from power points when the machines are to be cleaned.

2.5 KITCHEN TOOLS

A kitchen utensil is a hand-held, typically small tool that is designed for food-related functions. **Food preparation utensils** are a specific type of kitchen utensil, designed for use in the preparation of food. Some utensils are both food preparation utensils and eating utensils; for instance some implements of cutlery – especially knives – can be used for both food preparation in a kitchen and as eating utensils when dining.

In the Western world, utensil invention accelerated in the 19th and 20th centuries. It was fuelled in part by the emergence of technologies such as the kitchen stove and refrigerator, but also by a desire to save time in the kitchen, in response to the demands of modern lifestyles.

List

List of food preparation utensils

Name	Alternative names	Purpose in food preparation	Design	Image
Apple corer		To remove the core and pips from apples and similar fruits		
Apple cutter		To cut apple and similar fruits easily while simultaneously removing the core and pips.	Cf. peeler	
Baster		Used during cooking to cover meat in its own juices or with a sauce.	An implement resembling a simple pipette, consisting of a tube to hold the liquid, and a rubber top which makes use of a partialvacuum t o control the liquid's intake and release. The process of drizzling the liquid over meat is called *basting* – when a pastry brush is used in place of a baster, it is known as a *basting brush*.	

Biscuit cutter	*Biscuit mould, Cookie cutter, Cookie mould*	Shaping biscuit dough	Generally made of metal or plastic, with fairly sharp edges to cut through dough. Some biscuit cutters simply cut through dough that has been rolled flat, others also imprint or mould the dough's surface.	
Biscuit press	*Cookie press*	A device for making pressed cookies such as spritzgebäck.	It consists of a cylinder with a plunger on one end which is used toextrude cooki e dough through a small hole at the other end. Typically the cookie press has interchangeable perforated plates with holes in different shapes, such as a star shape or a narrow slit to extrude the dough in ribbons.	

Blow torch	*Blowtorch, blowlamp*	Commonly used to create a hard layer of caramelized sugar in a crème brûlée.		
Boil over preventer	*Milk watcher, Milk guard, Pot minder*	Preventing liquids from boiling over outside of the pot	A disc with a raised rim, designed to ensure an even distribution of temperature throughout the pot. This preventing bubbles from forming in liquids such as milk, or water which contains starch (for instance if used to cook pasta). Can be made of metal, glass or ceramic materials.	
Bottle opener		Twists the metal cap off of a bottle		

Bowl		To hold food, including food that is ready to be served	A round, open topped container, capable of holding liquid. Materials used to make bowls vary considerably, and include wood, glass and ceramic materials.	
Bread knife		To cut soft bread	A serrated blade made of metal, and long enough to slice across a large loaf of bread. Using a sawing motion, instead of pushing force as with most knives, it is possible to slice the loaf without squashing it.	
Browning tray	*Browning plate, Browning bowl*	Used in a microwave oven to help turn food brown	Generally made of glass or porcelain to absorb heat, which helps colour the layer of food in contact with its surface.	

Butter curler		Used to produce decorative butter shapes.		
Cake and pie server	*Cake shovel, pie cutter*	To cut slices in pies or cakes, and then transfer to a plate or container	This utensil typically features a thin edge to assist with slicing, and a large face, to hold the slice whilst transferring to a plate, bowl or other container.	
Cheese knife		Used to cut cheese.		
Cheesecloth		To assist in the formation of cheese	A gauzed cotton cloth, used to remove whey from cheese curds, and to help hold the curds together as the cheese is formed.	
Chef's knife		Originally used to slice large cuts of beef, it is now the general utility knife for most Western cooks.		

Cherry pitter	*Olive stoner*	Used for the removal of pits (stones) from cherries or olives.		
Chinois	*Chinoise*	Straining substances such as custards, soups and sauces, or to dust food with powder	A conical sieve	
Cleaver		Hacking through bone or slicing large vegetables (such as squash). The knife's broad side can also be used for crushing in food preparation (such as garlic).	A large broad bladed knife.	
Colander		Used for draining substances cooked in water	A bowl-shaped container with holes, typically made from plastic or metal. It differs from a sieve due to its larger holes, allowing larger pieces of food, such as pasta, to be drained quickly.	

Corkscrew		Pierces and removes a cork from a bottle.		
Crab cracker	*Lobster cracker*	Used to crack the shell of a crab or lobster	A clamping device, similar in design to a nutcracker but larger, with ridges on the inside to grip the shell.	
Cutting board		A portable board on which food can be cut.	Usually smaller and lighter than butcher's blocks, generally made from wood or plastic.	
Dough scraper	*Bench scraper, Scraper, Bench knife*	To shape or cut dough, and remove dough from a worksurface	Most dough scrapers consist of handle wide enough to be held in one or two hands, and an equally wide, flat, steel face.	
Edible			Tableware, such as plates,	

tableware			glasses, utensils and cutlery, that is edible	
Egg piercer		Pierces the air pocket of an eggshell with a small needle to keep the shell from cracking during hard-boiling. If both ends of the shell are pierced, the egg can be blown out while preserving the shell (for crafts).		
Egg poacher		Holds a raw egg, and is placed inside a pot of boiling water to poach an egg.		
Egg separator		A slotted spoon-like utensil used to separate the yolk of an egg from the egg white.		

Egg slicer		Slicing peeled, hard-boiled eggs quickly and evenly.	Consists of a slotted dish for holding the egg and a hinged plate of wires or blades that can be closed to slice.	
Egg timer		Used to correctly time the process of boiling eggs.	Historical designs range considerably, from hourglasses, to mechanical or electronic timers, to electronic devices which sense the water temperature and calculate the boiling rate.	
Fillet knife		A long, narrow knife with a finely serrated blade, used to slice fine filet cuts of fish or other meat.		
Fish scaler	*Urokotori*	Used to remove the scales from the skin of fish before cooking		

Fish slice	*Spatula, turner*	Used for lifting or turning food during cooking		
Flour sifter		Blends flour with other ingredients and aerates it in the process.		
Food mill		Used to mash or sieve soft foods.	Typically consists of a bowl, a plate with holes like a colander, and a crank with a bent metal blade which crushes the food and forces it through the holes.	
Funnel		Used to channel liquid or fine-grained substances into containers with a small opening.	A pipe with a wide, conical mouth and a narrow stem.	
Garlic press		Presses garlic cloves to create a puree, functioning like a specialized ricer.		

Grapefruit knife		Finely serrated knife for separating segments of grapefruit or other citrus fruit.		
Grater	*Cheese grater, Shredder*			
Gravy strainer	*Gravy separator*	A small pouring jug that separates roast meat drippings from melted fat, for making gravy.		
Herb chopper		Chops or minces raw herbs.		
Honey dipper		Drizzles honey.		
Ladle		A ladle is a type of serving spoon used forsoup, stew, or other foods.		

Lame		Used to slash the tops of bread loaves inartisan baking.		
Lemon reamer		A juicer with a fluted peak at the end of a short handle, where a half a lemon is pressed to release the juice.		
Lemon squeezer		A juicer, similar in function to a lemon reamer, with an attached bowl.	Operated by pressing the fruit against a fluted peak to release the juice into the bowl.	
Lobster pick	*Lobster fork*	A long-handled, narrow pick, used to pull meat out of narrow legs and other parts of a lobster or crab		

Mandoline				
Mated colander pot				
Measuring cup	*Measuring jug,Measuring jar*		The Pyrex-brand traditional measuring cup (the Anchor Hocking-brand look-alike is shown, right) is available in 1 cup (8 ounce), 2 cup (16 ounce), 4 cup (32 ounce) and 8 cup (64 ounce) sizes and includes U.S. customary units in quarter, third, half and two-thirds cup increments, as well as metric units.	

Measuring spoon		Typically sold in a set that measures dry or wet ingredients in amounts from 1/4 teaspoon (1.25 ml) up to 1 tablespoon (15 ml).		
Meat grinder	*Mincer*	Operated with a hand-crank, this presses meat through a chopping or pureeingattachment.		
Meat tenderiser				
Meat thermometer				

Melon baller		Small scoop used to make smooth balls of melon or other fruit, or potatoes.		
Mezzaluna		To finely and consistently chop/mince foods, especially herbs.		
Mortar and pestle	*Molcajete*	To crush food, releasing flavours and aromas	Generally made from either porcelain or wood, the mortar is shaped as a bowl. The pestle, generally shaped like a small club, is used to forcefully squeeze ingredients such as herbs against the mortar.	
Nutcracker		To crack open the hard outer shell of various nuts.		

Nutmeg grater		A small, specialized grating blade fornutmeg.		
Oven glove	*Oven mitt*	To protect hands from burning when handling hot pots or trays.		
Pastry bag		To evenly dispense soft substances (doughs, icings, fillings, etc.).		
Pastry blender		Cuts into pastry ingredients, such as flour and butter, for blending and mixing while they are in a bowl. It is made of wires curved into a crescent shape and held by a rigid handle.		
Pastry brush	*Basting brush*	To spread oil, juices, sauce or glaze on food.	Some brushes have wooden handles and natural or plastic bristles, whilst others have metal or	

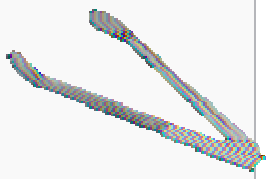
			plastic handles and silicone bris tles.	
Pastry wheel		Cuts straight or crimped lines through dough for pastry or pasta.		
Peel	*Pizza shovel*			
Peeler	*Potato peeler*			
Pepper mill	*Burr mill, burr grinder, pepper grinder*			
Pie bird	*Pie vent, pie funnel*			

Pizza cutter	*Pizza slicer*			
Potato masher				
Potato ricer	*Ricer*	Presses very smooth vegetable mashes orpurees, operates similar to a meat grinder/mincer.		
Pot-holder				
Poultry shears		Used for dejointing and cutting uncooked poultry; reinforced with a spring, they have one serrated blade and pointed tips.		

Roller docker				
Rolling pin		A long, rounded wooden or marble tool rolled across dough to flatten it.		
Salt shaker				
Scales	*Kitchen scales, Weighing scales*			

Scissors	*Kitchen scissors*			
Scoop	*Ice cream scoop*			
Sieve	*Sifter, Strainer*			
Slotted spoon	*Skimmer*			
Spatula				
Spider	*Sieve, spoon sieve, spoon skimmer, basket skimmer*	For removing hot food from a liquid or skimming foam off when making broths	A wide shallow wire-mesh basket with a long handle	

Sugar thermometer	*Candy thermometer*	Measuring the temperature, or stage, of sugar		
Tamis	*Drum sieve*	Used as a strainer, grater, or food mill.	A tamis has a cylindrical edge, made of metal or wood, that supports a disc of fine metal, nylon, or horsehair mesh. Ingredients are pushed through the mesh.	
Tin opener	*Can opener*	To open tins or cans	Designs vary considerably; the earliest tin openers were knives, adapted to open a tin as easily as possible.	
Tomato knife		Used to slice through tomatoes.	A small serrated knife.	

Tongs		For gripping and lifting. Usually used to move items on hot surfaces, such as barbecues, or to select small or grouped items, such as sugar cubes or salad portions.	Two long arms with a pivot near the handle.	
Trussing needle		For pinning, or sewing up, poultry and other meat.	Needle, about 20 cm long and about 3mm in diameter, sometimes with a blade at end for pushing through poultry	
Twine	*Butcher's twine, Cooking twine, Kitchen string, Kitchen twine*	For trussing roasts of meat or poultry.	Twine must be cotton—never synthetic—and must be natural—never bleached—in order to be "food grade".	
Whisk	*Balloon whisk, gravy whisk, flat whisk, flat coil whisk, bell whisk,* and other types.	To blend ingredients smooth , or to incorporate air into a mixture, in a process known as *whisking* or *whipping*	Most whisks consist of a long, narrow handle with a series of wire loops joined at the end. Whisks are also made from bamboo.	

Wooden spoon		For mixing and stirring during cooking and baking.		
Zester		For obtaining zest from lemons and othercitrus fruit.	A handle and a curved metal end, the top of which is perforated with a row of round holes with sharpened rims	 .

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2.6 USE CARE AND MAINTENANCE OF KNIVES

Knives

A cooking knife is very important equipment for any cook. So much so that cooks can be judged from the knives they use. The two most popular categories of knives are as follows:

1. Carbon steel knives (CSK)

2. Stainless steel knives (SSK)

CSK are quite easy to sharp and are not as expensive as SSK. However, they discolour during usage and rust if left in damp condition. SSK are avoided due to easy tainting and staining.

Types of handle design

Figure 2.1 shows the different parts of a knife.

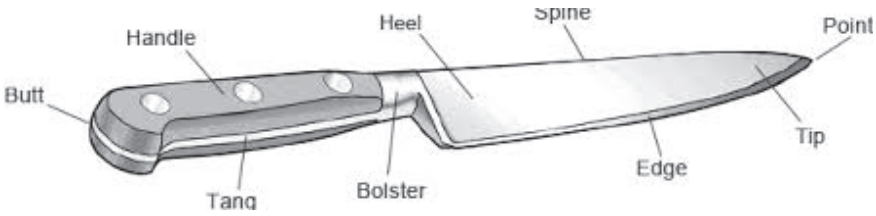


Fig 2.1: *Parts of Knife*

The types of handle design for knives are as follows:

1. **Pin tang knives:** In this type, the pin attaches the blade to the centre of the handle

2. **Scale tang knives:** In this type, the blade continues as a flange on to which the handle is fitted
Key aspects of knives

The key aspects of knives are as follows:

- Good cooking and good knives go hand in hand.
- Size of the knife is a matter of individual suitability
- A good knife should be nimble and fine edged with a sheath to slip into harmlessly.
- Knives should be used on proper chopping boards with sufficient working space.
- A knife should be sharp at all times.
- Correct holding techniques and finger manipulation must be practiced.
- A knife should never be left in dirty/standing water.

Types of knives

The different types of knives are as follows:

1. **Boning shaped blade:** This is used to maneuvour raw and cooked boning.

2. **Vegetable knife:** This is a small blade with a small handle used for p and finishing. It measures about 4"-6".

3. **Cook's knife:** This is a long knife and measures about 10" — 12". It is u for chopping in almost all preparations.

4. **Billeting knife:** It is a long flexible knife used for skinning and fillet'

5. **Palette knives:** These are available in varying sizes and are used f moving and handling prepared food.

Knife safety

To avoid getting hurt with a knife, you must practice the following:

• Always keep your knives sharp. This way, it will slide easily through what: you are cutting, with little force involved. If the knife is dull, you will have to force it to do the cutting, and if you slip a little, you will get hurt.

• When you are using a knife, pay a lot of attention to where the edge of your sharp blade is pointing. Do not cut with the edge towards you or you: fingers, because if you slip the blade may hurt you.

• Do not leave sharp knives loose in a drawer as banging around in the drawer ruins their sharp edges.

• If you are working with or handling a knife, and you drop it, stand back and let it fall, do not try to catch it as that can really hurt.

• If you have a dirty knife, do not toss it in the dishwasher. There is a good chance that the dishwasher would ruin the good edge. Wash the knives separately.

• When you are working with a knife, do not lay it down with the edge pointing up. It is hard to see the edge, and someone may put his hand down on it, and get hurt.

2.7 WORKING SPACE

Now that we have been introduced with the various types of equipments, let us see how we can arrange them for best utilization of space, time, energy and efficiency of the staff. We will see features of our working environment.

LOCATION OF THE KITCHEN

The kitchen should be located near the food outlet but if there is space constraint then the kitchen should be as near as possible to the food outlet. The factors which need to be considered while planning a kitchen is given below.

Liquor perishable and other food items should be stored as close to the kitchen as possible.

The service personnel should be able to get in and out of the kitchen without disturbing the operations. There should be no passage going through the kitchen. The local law must be followed.

WORKPLACE DESIGN

To achieve maximum productivity and efficiency a well-designed work place is required. The following factors should be considered while designing the work place:

- There should be floor space for the workers to move. There should be space for equipment, work tables and counters.
- There should be space for storing new materials on tables, carts, trolleys, trays.
- There should be space for storing finished product. Equipments such as bainmarie, hot case, salad trolleys, desert trolleys.
- There should be space for storing ingredients such as spices, dressing, sauces, seasoning.
- There should be space for utensils such as knives, choppers, slicers, beaters.
- There should be enough space for cold storage facilities.

FLOOR SPACE

The space required for a single person to work is 24-36 inches. If there are equipment's such as oven, steamers, refrigerators in the work area, the area should be extended by 6-12 inches. If two workers are working back to back the minimum work area required should be 48 inches.

WORK SURFACE SPACE

Work surface space depends on the work performed and the task conducted. Most tasks can be performed on a surface which is two feet in width and four feet in length Task such as chopping, cutting, slicing, whisking usually need a height of 30-31 inches.

MATERIAL HAND EQUIPMENT AND UTENSILE STORAGE

The space over and under the shelves, bins, drawers and cabinets are generally used for storage purpose. The placement of this equipment ensures smoother and easier working. The mobile trolleys should be placed near to the work place.

WORKPLACE ENVIRONMENT

It is necessary to have a encouraging work environment to increase the efficiency of the workers with minimum efforts. Continuous expose to high temperature, high humidity and radiation may result in considerable discomfort. The kitchen workers can perform efficiently if the temperature is between 65-70 degree F in summers and 69-73 degree F in winters. The temperature and weather of the work place can be controlled by managing and heating, cooling and ventilation of the buildings. The heat and moisture can be minimized by using products which are well insulin. All pipes carrying hot water should also be insulated.

The lighting system should provide sufficient light for the workers to handle equipment and

Ingredient properly and work conveniently. Care should be taken to avoid direct and reflected.

Light as it obstructs visibility. A good exhaust and ventilation system is required to remove smoke, odour, moisture and heat. In warmer climate air conditioning is required.

Equipment Placement

The layout of a kitchen is conceptualized after developing the work place, determining the equipment required and estimating the total space. The layout is determined by the flow of material, pre-preparation and pickup. The layout must minimize the movement which will conserve energy and prevent fatigue.

PRINCIPLES FOR PLANNING THE LAYOUT

- By passing crossing of personnel should be minimized.
- The flow should be along straight lines; too many turns will obstruct the operation.
- Reverse movement of personnel should be minimized to prevent accidents.
- All plumbing service equipment's should be installed close to each other.
- The central panel of electricity should be installed in the same general area where the electrical equipment is to be used.
- Hot food area should be planned in one place and cold food area in another.
- The distance between the hot range and the pickup counter should be at least forty two inches.
- The fryer should never be planned near the sink.
- An electrical appliance and gas appliance should be kept at a distance of at least eighteen inches.
- The equipment should be arranged in such a manner that it minimizes walking.
- A small sink near the cooking area is a must.
- A refrigerator near the cooking area is required to reduce the opening and closing of the walk in refrigerator.
- There should be to separate doors for the service personnel to leave and enter the kitchen.
- Area such as pot wash, masala grinding should be planned away from the restaurant.
- An effective exhaust system should be installed to prevent over heating in the kitchen.

- Equipment's such as soup trolleys, bread warmers, tea coffee boilers, ice cream cabinet should be kept near the restaurant to prevent disturbance in the food production area.
- Storage area for china glass wear linen should be provided with ample space.
- Sufficient area should be allocated for pot wash.

Positioning ranges or cookers is important. One efficient way is to install stove equipment in a cluster, with a ventilation canopy above. There should be room for a cook at the centre of this work 'island' and plenty of space around it. Bain made and stockpot stands should be close to ranges. Boiling tables, steaming ovens and vegetable boiling pans should also be near the centre of the kitchen and should be easily accessible to the workers at vegetable preparation tables. Adequate provision for carts, mobile racks and other mobile processing apparatus should he made. The deep fat fryer should be sited near the main ranges, but with a separate extract canopy of its own. Generally, a canopy edge should project beyond a cooking equipment by at least 45 mm (18 in) on the side where equipment doors open and 305 mm (12 in) on the other sides. It should be mounted 2 m (6 ft 9 in) above floor level. Canopies should be fitted with a small gutter around the bottom to deal with any

Food Preparation Surfaces

Preparation tables topped with stainless steel, laminated plastic or some other impervious materials are easy to clean, and thus, hygienic. Human beings vary in size and reach, yet tables and work surfaces must he sufficiently high for everyone. Short employees can always use a stand, but taller employees should not be forced to bend. The best solution is an adjustable table with screw-out legs. Failing that, the table heights, which will suit most people, are as follows:

For light work, average worktable heights are 925 to 975 mm (37 to 39 in) for women and 975 to 1,000 mm (39 to 41 in) for men; for heavy work, height approximately 900 mm (36 in) is good. People can reach approximately 370 to 500 mm (14 1/2 to 21 in) without stretching.

A worktable's width should be 700 to 750 mm (24 to 30 in). If the table has to accommodate containers or other material at the back, then a 900 mm (36 in) width is sufficient. Approximately 1.2 to 1.8 meters (4 to 6 feet of table length is adequate for one person), and 2.4 to 3 m (8 to 10 ft) suffices for two people working side by side. These figures are all average estimates and should not be considered definitive.

Fig 2.02:*Work Table*

Cutting Boards

Chefs have long preferred wooden cutting boards, but it is now known that these are more contaminated than impervious surfaces having no cracks or pores to collect food particles and bacteria. Washing wooden boards at temperature at less than 42° C (108° F) does not kill the bacteria. As a result, butcher's blocks and cutting boards now have synthetic surfaces made of polypropylene, rubber clay compound, synthetic rubber or some other impervious material. Chefs must select boards according to costs, operational requirements and their own personal experience.

Fig 2.03: *Chopping Board*

Sinks

Ancillary tasks are also important. Arrangements for washing of pans, crockery and cutlery must be convenient as well as sanitary. There should be adequate racking for washed dishes and space for those awaiting treatment. Mechanized systems with conveyer belts should be used if affordable. Sinks and draining both should be fitted wherever possible along the external walls. More natural light will be available to people working at them if they are placed under windows. The guidelines mentioned previously for workable heights and width should also be applied to sinks. Detachable tops for sinks may be useful (especially in vegetable room) in providing extra

preparation space. In addition to stainless steel sinks for dishwashing, porcelain sinks should be available for ordinary hand washing .

Fig 2.04: *KITCHEN Sink*

Ventilation

The efficiency and productivity of the kitchen staff may be hampered or enhanced by the kitchen's levels of heating and ventilation. Kitchen ventilation must be sufficient to maintain comfortable working conditions, prevent condensation and confine cooking smells to the kitchen. A kitchen will be clean and grease-free only if the ventilation system is proper. Proper kitchen ventilation system improves indoor air quality as it removes harmful cooking contaminants (e.g., smoke, heat, steam, odour and hazardous gases such as nitrogen dioxide and carbon monoxide generated by gas stoves).

The three basic factors should be considered for choosing a kitchen ventilation system:

(i) Price
(ii) Noise
(iii) Effectiveness/capacity

Colour

The colour of walls, ceilings and floors can aid staff efficiency and cleanliness, by increasing light reflection, and can affect staff moods, by providing an encouraging and pleasant workplace. Advice should be sought from an architect, interior designer or other expert regarding the reflective value and the most effective use of colours. Different paint manufacturers often use different descriptive names for the same basic shades of colour. Preferable shades of colour for a well-planned kitchen are white, off-white, ivory, buttermilk, pale-yellow, pale-green, pale-blue, bluish-green. The colour is also important in creating effects of spaciousness or closeness. The cool colours (blue, green, ivory), for instance, make an area seem larger and airier. Hot colours (red, orange, yellow), on the other hand, make space seem smaller. Careful use of colour gives the decorator an opportunity to 'modify' faults that cannot be structurally altered.

Ceilings

On kitchen ceilings, paints that inhibit moisture condensation should be used. Ceilings need no longer be very high to accomplish ventilation purposes because fan and air conditioners are common. Nevertheless a high ceiling up to approximately 3 in (10 ft) can give workers a psychological lift and also aid in lighting. A hemmed-in oppressive room is to be avoided. On the other hand, higher ceiling kitchens are noisier kitchens unless sound-deadening materials are used.

Storage Temperature

Storage temperature (without refrigeration) recommended for dry goods and vegetable storage are approximately 5°C to 21°C (41°F to 70°F) for 8°C to 20°C (64°F to 75° F) for ripening fruits 10 (50°F) or potatoes and 9°C (48°F) for other vegetables These temperature should be maintained by natural ventilation or by air conditioning in warm weather.

Vegetable Storage

Vegetables should be stored and prepared in an area separate from the kitchen that soil brought in with them does not come into contact with other foods. Vegetables packed close together in warm, unventilated corners will deteriorate rapidly. They will last much longer if stored on raised platforms with slats or open mesh racks so that they are kept as cool and as exposed to circulating air possible. Galvanized tubing is preferable to wooden shelves. Racks or bins should be mounted at least 230 mm (9 in) above the floor and fitted at the bottom s removable dust collection trays. An electrically operated peeling machine, a tank, a sink, and preparation tables should be included in the adjacent vegetable section.

WORK CENTERS IN THE KITCHEN LAYOUT

Work centres in the kitchen layout should be planned on the following basic concepts:

- SMOOTH WORK FLOW
- PREVENTION OF CONGESTION AT WORK TABLES AND SINKS
- PROVISION OF A COMFORTABLE WORK ENVIRONMENT
- HYGIENE AND SANITATION

SMOOTH WORK FLOW:

Smooth work flow in kitchen can be managed by arranging the work performed in a organized manner. The following are the main work centres:

- Preparation centre for meat fish and poultry.
- Preparation centre for vegetables and fruits.
- Cooking centre.
- Service centre.
- And washing up area.

PREVENTION OF CONGESTION AT WORK TABLES AND SINKS:

Overcrowding of kitchen is possible due to:

- Improper planning and placement of large equipment's may create unnecessary congestion. 3.5-4 sq meter floor space per person is required.
- Improper work schedule and timing. The job distributed among the members is carried on smoothly without causing inconvenience to one another.
- The equipment's should be used in a systematic manner, over utilization of equipment's may result in congestion.
- The entry of non-staff members of kitchen should be restricted to avoid overcrowding in the kitchen which will restrict smooth flow of work.

PROVISION OF A COMFORTABLE WORK ENVIRONMENT:

- The kitchen produces a lot of heat due to equipment's used in the kitchen. It is very difficult to control the temperature and humidity. Extractor hoods are installed over the cooking area trying to control the heat and temperature.
- The floor should be noise resistant and non-slippery. The sealing and walls should be noise proof. The kitchen should be spacious, bright, having a relax working environment.
- The workers will be more efficient if they work and feel safe in the kitchen.
- The working environment of the kitchen should not be tensed but a harmonious relationship must be maintained at work place. Co-ordination between the seniors and there juniors should be there to provide a healthy work environment.

2.8 SAFETY PROCEDURES

Sanitation is an integral part of any kitchen. Every person working in the hospitality industry is responsible for keeping their work environment safe. Ensure that the kitchen has a first aid kit and manual to help the staff carries out the following first aid procedures,

- Checking pulse rate
- Clearing airways
- Administering expired air resuscitation
- Administering cardio pulmonary resuscitation

Accidents occur because of ignorance. Accidents are caused by a number of factors;

- Disregarding safety rules
- Lack of concentration while performing a task
- Working at an unsafe speed

Rules to be observed in kitchen

- Do not panic and try to keep as calm as possible
- Avoid putting yourself in danger
- Take any immediate action that you can to minimize injury
- Get help as soon as you can

2.8.1 ***PREVENTION OF INJURIES***

Alertness in the kitchen can help prevent a lot of injuries. Following precautions must be taken;

Knives and choppers

- Use the correct knife for the job.
- Always use a clean sharp knife
- Always cut food on a chopping board.
- Keep the fingers and nails clear of the blade when slicing or chopping
- Keep handles of knives grease free to prevent the knife from slipping.
- Never bone or fillet meat or fish in a frozen state.
- Take care while scoring pork rind as it has a greasy surface.
- While cutting large or hard food items such as pumpkins, use a heavy and sharp knife.
- Knives should be carried with the blade pointing downwards
- Wipe knives clean with the edge away from hands
- Never try to catch a falling knife.

Cutting Blades on Machines

- Machines should be used with safety guards in place
- Keep hands away from the moving parts of the machines
- Before guards are removed for cleaning, the machine should be switched off at the power point and the plug pulled out.

- Do not remove food from a machine until it stops

Cuts from meat and fish bones

- Always attend to cuts made by bones because they can become septic. The cuts caused by spines or spikes on fish and shellfish are particularly prone to infection.
- Allow frozen meat to thaw completely before boning, because half frozen meat is difficult to handle and knife can slip easily

Broken crockery and glass

- Use a heavy, damp paper towel to pick glass slivers.
- Dispose off broken glass and dishes cautiously. Wrap them in thick papers

Treatment for cuts and bleeding

- For minors' cuts and scratches, clean the skin around the wound and cover it with a waterproof dressing.
- If bleeding is heavy, make the person sit or lie down, and raise the injured part to reduce the blood flow.
- Heavy bleeding can be controlled by direct pressure and by applying a firm dressing or bandage to the cut.

2.9 FUEL: TYPES, USE AND PRECAUTIONS

A fuel is any material that can be made to react with other substances so that it releases chemical or nuclear energy as heat or to be used for work. The concept was originally applied solely to those materials capable of releasing chemical energy but has since also been applied to other sources of heat energy such as nuclear energy (via nuclear fission or nuclear fusion).

The heat energy released by reactions of fuels is converted into mechanical energy via a heat engine. Other times the heat itself is valued for warmth, cooking, or industrial processes, as well as the illumination that comes with combustion. Fuels are also used in the cells of organisms in a process known as cellular respiration, where organic molecules are oxidized to release usable energy. Hydrocarbons and related oxygen-containing molecules are by far the most common source of fuel used by humans, but other substances, including radioactive metals, are also utilized.

2.9.1 Types of fuel

Solid fuel

Solid fuel refers to various types of solid material that are used as fuel to produce energy and provide heating, usually released through combustion. Solid fuels include wood (see wood fuel),

Fig 2.05:*Coal is an important solid fuel*.

charcoal, peat, coal, Hexamine fuel tablets, and pellets made from wood (see wood pellets), corn, wheat, rye and other grains. Solid-fuel rocket technology also uses solid fuel (see solid propellants). Solid fuels have been used by humanity for many years to create fire. Coal was the fuel source which enabled the industrial revolution, from firing furnaces, to running steam engines. Wood was also extensively used to run steam locomotives. Both peat and coal are still used in electricity generation today. The use of some solid fuels (e.g. coal) is restricted or prohibited in some urban areas, due to unsafe levels of toxic emissions. The use of other solid fuels such as wood is decreasing as heating technology and the availability of good quality fuel improves. In some areas, smokeless coal is often the only solid fuel used. In Ireland, peat briquettes are used as smokeless fuel. They are also used to start a coal fire.

Liquid fuels

Fig 2.06:*A gasoline station*.

Liquid fuels are combustible or energy-generating molecules that can be harnessed to create mechanical energy, usually producing kinetic energy; they also must take the shape of their container. It is the fumes of liquid fuels that are flammable instead of the fluid.

Most liquid fuels in widespread use are derived from the fossilized remains of dead plants and animals by exposure to heat and pressure in the Earth's crust. However, there are several types, such as hydrogen fuel (for automotive uses), ethanol, jet fuel and biodiesel which are all categorized as a liquid fuel. Emulsified fuels of oil-in-water such as orimulsion have been developed a way to make heavy oil fractions usable as liquid fuels. Many liquid fuels play a primary role in transportation and the economy.

Some common properties of liquid fuels are that they are easy to transport, and can be handled with relative ease. Also they are relatively easy to use for all engineering applications, and home use. Fuels like kerosene are rationed in some countries, for example available in government subsidized shops in India for home use.

Conventional diesel is similar to gasoline in that it is a mixture of aliphatic hydrocarbons extracted from petroleum. Kerosene is used in kerosene lamps and as a fuel for cooking, heating, and small engines. Natural gas, composed chiefly of methane, can be compressed to a liquid and used as a substitute for other traditional liquid fuels. LP gas is a mixture of propane and butane, both of which are easily compressible gases under standard atmospheric conditions. It offers many of the advantages of compressed natural gas (CNG), but is denser than air, does not burn as cleanly, and is much more easily compressed. Commonly used for cooking and space heating, LP gas and compressed propane are seeing increased use in motorized vehicles; propane is the third most commonly used motor fuel globally.

Gaseous fuels

Fig 2.07: *A 20-pound (9.1 kg) propane cylinder.*

Fuel gas is any one of a number of fuels that under ordinary conditions are gaseous. Many fuel gases are composed of hydrocarbons (such as methane or propane), hydrogen, carbon monoxide, or mixtures thereof. Such gases are sources of potential heat energy or light energy that can be readily transmitted and distributed through pipes from the point of origin directly to the place of

consumption. Fuel gas is contrasted with liquid fuels and from solid fuels, though some fuel gases are liquefied for storage or transport. While their gaseous nature can be advantageous, avoiding the difficulty of transporting solid fuel and the dangers of spillage inherent in liquid fuels, it can also be dangerous. It is possible for a fuel gas to be undetected and collect in certain areas, leading to the risk of a gas explosion. For this reason, odorizers are added to most fuel gases so that they may be detected by a distinct smell. The most common type of fuel gas in current use is natural gas.

Biofuels

Biofuel can be broadly defined as solid, liquid, or gas fuel consisting of, or derived from biomass. Biomass can also be used directly for heating or power—known as biomass fuel. Biofuel can be produced from any carbon source that can be replenished rapidly e.g. plants. Many different plants and plant-derived materials are used for biofuel manufacture.

Perhaps the earliest fuel employed by humans is wood. Evidence shows controlled fire was used up to 1.5 million years ago at Swartkrans, South Africa. It is unknown which hominid species first used fire, as both Australopithecus and an early species of Homo were present at the sites. As a fuel, wood has remained in use up until the present day, although it has been superseded for many purposes by other sources. Wood has an energy density of 10–20 MJ/kg.

Recently biofuels have been developed for use in automotive transport (for example Bioethanol and Biodiesel), but there is widespread public debate about how carbon efficient these fuels are.

Fossil fuels

Fig 2.08:*Extraction of petroleum*

Fossil fuels are hydrocarbons, primarily coal and petroleum (liquid petroleum or natural gas), formed from the fossilized remains of ancient plants and animals by exposure to high heat and pressure in the absence of oxygen in the Earth's crust over hundreds of millions of years. Commonly, the term fossil fuel also includes hydrocarbon-containing natural resources that are not derived entirely from biological sources, such as tar sands. These latter sources are properly known as mineral fuels.

Fossil fuels contain high percentages of carbon and include coal, petroleum, and natural gas. They range from volatile materials with low carbon:hydrogen ratios like methane, to liquid petroleum to nonvolatile materials composed of almost pure carbon, like anthracite coal. Methane can be found in hydrocarbon fields, alone, associated with oil, or in the form of methane clathrates. Fossil fuels formed from the fossilized remains of dead plants by exposure to heat and pressure in the Earth's crust over millions of years. This biogenic theory was first introduced by German scholar Georg Agricola in 1556 and later by Mikhail Lomonosov in the 18th century.

It was estimated by the Energy Information Administration that in 2007 primary sources of energy consisted of petroleum 36.0%, coal 27.4%, natural gas 23.0%, amounting to an 86.4% share for fossil fuels in primary energy consumption in the world. Non-fossil sources in 2006 included hydroelectric 6.3%, nuclear 8.5%, and others (geothermal, solar, tidal, wind, wood, waste) amounting to 0.9%. World energy consumption was growing about 2.3% per year.

Fossil fuels are non-renewable resources because they take millions of years to form, and reserves are being depleted much faster than new ones are being made. So we must conserve these fuels and use them judiciously. The production and use of fossil fuels raise environmental concerns. A global movement toward the generation of renewable energy is therefore under way to help meet increased energy needs. The burning of fossil fuels produces around 21.3 billion tonnes (21.3 gigatonnes) of carbon dioxide (CO_2) per year, but it is estimated that natural processes can only absorb about half of that amount, so there is a net increase of 10.65 billion tonnes of atmospheric carbon dioxide per year (one tonne of atmospheric carbon is equivalent to 44/12 or 3.7 tonnes of carbon dioxide). Carbon dioxide is one of the greenhouse gases that enhances radiative forcing and contributes to global warming, causing the average surface temperature of the Earth to rise in response, which the vast majority of climate scientists agree will cause major adverse effects. Fuels are a source of energy.

2.9.2 Safety Precautions against fire injuries, burns and scalds

The following factors should be kept in mind to prevent both burns and scalds;

- Sleeves should be rolled down to protect arms and an apron should be worn at a suitable length. Shoes should have a closed toe to protect the feet.
- Use thick dry oven gloves to handle hot utensils
- Hot pots or containers should be carried with both hands
- Handles of pans should not be allowed to protrude over the edge of the stove.
- Keep pot handles away from any direct source of heat.

- Never overfills pans and containers with hot food or liquids.
- Avoid dropping wet food into hot oil or fat.
- Warn others about hot pans and plates.
- Lift the lids of hot pans away from you to allow the steam to escape.
- Stand to the side when opening steamers and ovens.
- Keep your face well back when passing liquids through conical strainers
- Open valves of streamers ad pressure cookers slowly and stand to the side.

2.10 FIRE: INTRODUCTION, TYPE AND HANDLING

(Source: Wikipedia)

Fire is the rapid **oxidation** of a material in the **exothermic** chemical process of **combustion**, releasing **heat**, **light**, and various reaction **products**. Slower oxidative processes like **rusting** or **digestion** are not included by this definition.

Fire is hot because conversion of the weak double bond in molecular oxygen, O_2, to the stronger bonds in the combustion products carbon dioxide and water **releases energy** (418 kJ per 32 g of O_2); the bond energies of the **fuel** play only a minor role here. At a certain point in the combustion reaction, called the ignition point, flames are produced. The ***flame*** is the visible portion of the fire. Flames consist primarily of carbon dioxide, water vapor, oxygen and nitrogen. If hot enough, the gases may become ionized to produce **plasma**. Depending on the substances alight, and any impurities outside, the **color** of the flame and the fire's **intensity** will be different.

Fire in its most common form can result in **conflagration**, which has the potential to cause physical damage through **burning**. Fire is an important process that affects ecological systems around the globe. The positive effects of fire include stimulating growth and maintaining various ecological systems.

The negative effects of fire include hazard to life and property, atmospheric pollution, and water contamination. If fire removes **protective vegetation**, heavy **rainfall** may lead to an increase in **soil erosion by water**. Also, when vegetation is burned, the **nitrogen** it contains is released into the atmosphere, unlike elements such as **potassium** and **phosphorus** which remain in the **ash** and are quickly recycled into the soil. This loss of nitrogen caused by a fire produces a

long-term reduction in the fertility of the soil, which only slowly recovers as nitrogen is "**fixed**" from the atmosphere by **lightning** and by **leguminous** plants such as **clover**.

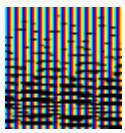
Fire has been used by humans in **rituals**, in agriculture for clearing land, for cooking, generating heat and light, for signaling, propulsion purposes, **smelting**, **forging**, **incineration** of waste, **cremation**, and as a weapon or mode of destruction.

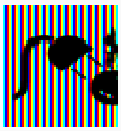
Classes of Fire

(Wikipedia)

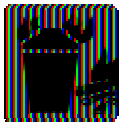
Fire class is a term used to denote the type of **fire**, in relation to the combustion materials which have (or could be) ignited. This has onward impacts on the type of suppression or extinguishing materials which can be used. Class letters are often assigned to the different types of fire, but these differ between territories. There are separate US, European, and Australian standards.

Fire classes by country

Image	Description	European	United States	Australian	Suitable suppression
	Combustible materials (wood, paper, fabric, refuse)	Class A	Class A	Class A	Most suppression techniques
	Flammable liquids	Class B	Class B	Class B	Inhibiting chemical chain reaction, such as water mist dry chemical or **Halon**
	Flammable gas	Class C	Class B	Class C	Inhibiting chemical chain reaction, such as dry chemical or Halon
	Flammable metals	Class D	Class D	Class D	Specialist suppression required

	Electrical fire	Not classified (Class E)	Class C	Class E	As ordinary combustibles, but conductive agents like water not to be used
	Cooking oils and fats	Class F	Class K	Class F	Suppression by removal of oxygen or water mist

Ordinary combustibles



Class A fires consist of ordinary combustibles such as wood, paper, fabric, and most kinds of trash.

Flammable liquid

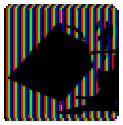
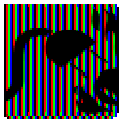


Fig 2.09:*A CO 2 fire extinguisher rated for flammable liquids and gasses*

These are fires whose fuel is flammable or combustible liquid or gas. The US system designates all such fires "Class B". In the European/Australian system, flammable liquids are designated "Class B", while burning gases are separately designated "Class C". These fires follow the same basic fire tetrahedron (heat, fuel, oxygen, chemical reaction) as ordinary combustible fires, except that the fuel in question is a flammable liquid such as gasoline, or gas such as **natural gas**. A solid stream of water should never be used to extinguish this type because it can cause the fuel to scatter, spreading the flames. The most effective way to extinguish a liquid or gas fueled fire is by inhibiting the chemical chain reaction of the fire, which is done by dry chemical and **Halon** extinguishing agents, although smothering with CO_2 or, for liquids, foam is also effective. Halon has fallen out of favor in recent times because it is an ozone-depleting material; the Montreal Protocol declares that Halon should no longer be used. Chemicals such as **FM-200** are now the recommended halogenated suppressant.

Electrical



Electrical fires are fires involving potentially energized **electrical** equipment. The US system designates these "Class C"; the Australian system designates them "Class E". This sort of fire may be caused by short-circuiting machinery or overloaded electrical cables. These fires can be a severe hazard to firefighters using water or other conductive agents, as electricity may be conducted from the fire, through water, to the firefighter's body, and then **earth**. **Electrical shocks** have caused many firefighter deaths.

Electrical fire may be fought in the same way as an ordinary combustible fire, but water, foam, and other conductive agents are not to be used. While the fire is or possibly could be electrically energized, it can be fought with any extinguishing agent rated for electrical fire. **Carbon dioxide**CO_2, NOVEC 1230, **FM-200** and dry chemical powder extinguishers such as **PKP** and even baking soda are especially suited to extinguishing this sort of fire. PKP should be a last resort solution to extinguishing the fire due to its corrosive tendencies. Once electricity is shut off to the equipment involved, it will generally become an ordinary combustible fire.

In Europe, "electrical fires" are no longer recognized as a separate class of fire as electricity itself cannot burn. The items around the electrical sources may burn. By turning the electrical source off, the fire can be fought by one of the other class of fire extinguishers

Metal

Class D fires involve combustible metals - especially **alkali metals** like **lithium** and **potassium**, **alkaline earth metals** such as **magnesium**, and **group 4 elements** such as **titanium**and **zirconium**.

Metal fires represent a unique hazard because people are often not aware of the characteristics of these fires and are not properly prepared to fight them. Therefore, even a small metal fire can spread and become a larger fire in the surrounding ordinary combustible materials. Certain metals **burn in contact with air** or water (for example, **sodium**), which exaggerate this risk. Generally speaking, masses of combustible metals do not represent great fire risks because heat is conducted away from hot spots so efficiently that the heat of combustion cannot be maintained. In consequence, significant heat energy is required to ignite a contiguous mass of combustible metal. Generally, metal fires are a hazard when the metal is in the form of sawdust, machine shavings or other metal "fines", which combust more rapidly than larger blocks. Metal fines can be ignited by the same ignition sources that would start other common fires.

Care must be taken when extinguishing metal fires. Water and other common firefighting agents can excite metal fires and make them worse. The **National Fire Protection Association** recommends that metal fires be fought with dry powder extinguishing agents that work by smothering and heat absorption. The most common agents are **sodium chloride** granules and **graphite** powder. In recent years, powdered **copper** has also come into use. These *dry powder* extinguishers should not be confused with those that contain *dry chemical* agents. The two are not the same, and only dry powder should be used to extinguish a metal fire. Using a dry chemical extinguisher in error, in place of dry powder, can be ineffective or actually increase the intensity of a metal fire.

Cooking oils and fats (kitchen fires)

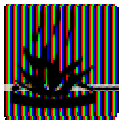


Fig 2.10: *Laboratory simulation of a**chip pan** fire: a beaker containing wax is heated until it catches fire. A small amount of water is then poured into the beaker. The water sinks to the bottom and vaporizes instantly, ejecting a plume of burning liquid wax into the air.*

Class K fires involve unsaturated cooking oils in well-insulated cooking appliances located in commercial kitchens.

Fires that involve **cooking oils** or fats are designated "Class K" under the American system, and "Class F" under the European/Australasian systems. Though such fires are technically a subclass of the flammable liquid/gas class, the special characteristics of these types of fires, namely the higher flash point, are considered important enough to recognize separately. Water mist can be used to extinguish such fires. Appropriate fire extinguishers may also have hoods over them that help extinguish the fire. Sometimes **fire blankets** are used to stop a fire in a kitchen or on a stove.

2.11 FIRE EXTINGUISHERS

A **fire extinguisher**, or **extinguisher**, is an active fire protection device used to extinguish or control small fires, often in emergency situations. It is not intended for use on an out-of-control fire, such as one which has reached the ceiling, endangers the user (i.e., no escape route, smoke, explosion hazard, etc.), or otherwise requires the expertise of a fire department. Typically, a fire extinguisher consists of a hand-held cylindrical pressure containing an agent which can be discharged to extinguish a fire. Fire extinguishers manufactured with non-cylindrical pressure vessels also exist, but are less common.

Fig 2.11:*A stored-pressure fire extinguisher made by Oval Brand Fire Products*

In the United States, fire extinguishers in all buildings other than houses are generally required to be serviced and inspected by a fire protection service company at least annually. Some jurisdictions require more frequent service for fire extinguishers. The servicer places a tag on the extinguisher to indicate the type of service performed (annual inspection, recharge, new fire extinguisher).

Fig 2.12:A *British fire extinguisher with ID sign, call point and fire action sign*

There are two main types of fire extinguishers: stored-pressure and cartridge-operated. In stored pressure units, the expellant is stored in the same chamber as the **firefighting** agent itself. Depending on the agent used, different propellants are used. With dry chemical extinguishers,**nitrogen** is typically used; water and foam extinguishers typically use air. Stored pressure fire extinguishers are the most common type. Cartridge-operated extinguishers contain the expellant gas in a separate cartridge that is punctured prior to discharge, exposing the propellant to the extinguishing agent. This type is not as common, used primarily in areas such as industrial facilities, where they receive higher-than-average use. They have the advantage of simple and prompt recharge, allowing an operator to discharge the extinguisher, recharge it, and return to the fire in a reasonable amount of time. Unlike stored pressure types, these extinguishers use compressed **carbon dioxide** instead of nitrogen, although nitrogen cartridges are used on low temperature (-60 rated) models. Cartridge operated extinguishers are available in dry chemical and dry powder types in the U.S. and in water, wetting agent, foam, dry chemical (classes ABC and B.C.), and dry powder (class D) types in the rest of the world.

Fig 2.13: *Wheeled fire extinguisher and a sign inside a parking lo*t

Fire extinguishers are further divided into handheld and cart-mounted (also called wheeled extinguishers). Handheld extinguishers weigh from 0.5 to 14 kilograms (1.1 to 30.9 lb), and are hence, easily portable by hand. Cart-mounted units typically weigh more than 23 kilograms (51 lb). These wheeled models are most commonly found at **construction sites**, **airport runways**, **heliports**, as well as **docks** and **marinas**.

Classification of Fire Extinguishers

Internationally there are several accepted classification methods for hand-held fire extinguisher. Each classification is useful in fighting fires with a particular group of fuel.

Australia and New Zealand

Specifications for fire extinguishers are set out in the standard AS/NZS 1841, the most recent version being released in 2007. All fire extinguishers must be painted signal red. Except for water extinguishers, each extinguisher has a coloured band near the top, covering at least 10% of the extinguisher's body length, specifying its contents.

Type	**Band colour**	**Fire classes (brackets denote sometimes applicable)**					
		A	**B**	**C**	**D**	**E**	**F**
Water	Signal red	A					

Wet chemical	Oatmeal	A					F
Foam	Ultramarine blue	A	B				
Dry powder	White	A	B	C		E	
Dry powder (metal fires)	Lime green				D		
Carbon dioxide	Black	(A)	B			E	
Vaporizing liquid (non-halon clean agents)	Golden yellow	A	B	C		E	
Halon	No longer produced	A	B			E	

In Australia, yellow (Halon) fire extinguishers are illegal to own or use on a fire, unless an essential use exemption has been granted, this is due to the ozone-depleting nature of halon.

United Kingdom

Fig 2.14:*Typical United Kingdom CO_2 and water fire extinguishers*

According to the standard BS EN 3, fire extinguishers in the United Kingdom as all throughout Europe are red RAL 3000, and a band or circle of a second color covering between 5–10% of the

surface area of the extinguisher indicates the contents. Before 1997, the entire body of the fire extinguisher was color coded according to the type of extinguishing agent.

The UK recognises six fire classes:

- Class A fires involve organic solids such as paper and wood.
- Class B fires involve flammable or combustible liquids, including petrol, grease, and oil.
- Class C fires involve flammable gases.
- Class D fires involve combustible metals.
- Class E fires involve electrical equipment/appliances.
- Class F fires involve cooking fat and oil.

Class E has been discontinued, but covered fires involving electrical appliances. This is no longer used on the basis that, when the power supply is turned off, an electrical fire can fall into any of the remaining five categories.

Type	**Old code**	**BS EN 3 colour code**	**Fire classes (brackets denote sometimes applicable)**					
			A	**B**	**C**	**D**	**E**	**F**
Water	Signal red	Signal red	A					
Foam	Cream	Red with a cream panel above the operating instructions	A	B				
Dry powder	French blue	Red with a blue panel above the operating instructions	(A)	B	C		E	
Carbon dioxide, CO_2	Black	Red with a black panel above the operating instructions		B			E	
Wet chemical	N/A	Red with a canary yellow panel above the operating instructions	A	(B)				F
Class D	French	Red with a blue panel above the				D		

powder	blue		operating instructions						
Halon 1211/BCF	Emerald green		No longer in general use	A	B			E	

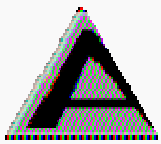
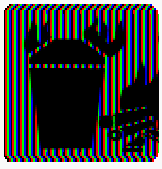
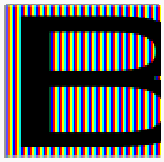
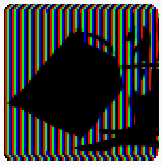
In the UK the use of Halon gas is now prohibited except under certain situations such as on aircraft and in the military and police.

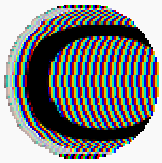
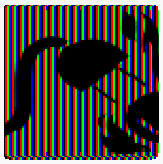
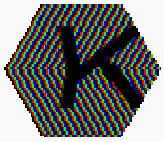
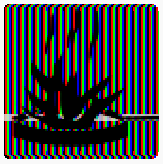
Fire extinguishing performance per fire class is displayed using numbers and letters such as 13A, 55B.

EN3 does not recognise a separate electrical class - however there is an additional feature requiring special testing (35 kV dielectric test per EN 3-7:2004). A powder or CO_2extinguisher will bear an electrical pictogramme as standard signifying that it can be used on live electrical fires (given the symbol E in the table). If a water-based extinguisher has passed the 35 kV test it will also bear the same electrical pictogramme - however, any water-based extinguisher is only recommended for inadvertent use on electrical fires.

United States

There is no official standard in the United States for the color of fire extinguishers, though they are typically red, except for class D extinguishers which are usually yellow, water and Class K wet chemical extinguishers which are usually silver, and water mist extinguishers which are usually white. Extinguishers are marked with pictograms depicting the types of fires that the extinguisher is approved to fight. In the past, extinguishers were marked with colored geometric symbols, and some extinguishers still use both symbols. The types of fires and additional standards are described in NFPA 10: Standard for Portable Fire Extinguishers, 2013 edition.

Fire class	Geometric symbol		Pictogram	Intended use	Mnemonic
A				Ordinary solid combustibles	A for "Ash"
B				Flammable liquids and gases	B for "Barrel"

C				Energized electrical equipment	C for "Current"
D				Combustible metals	D for "Dynamite"
K				Oils and fats	K for "Kitchen"

Fire extinguishing capacity is rated in accordance with ANSI/UL 711: Rating and Fire Testing of Fire Extinguishers. The ratings are described using numbers preceding the class letter, such as 1-A:10-B:C. The number preceding the A multiplied by 1.25 gives the equivalent extinguishing capability in gallons of water. The number preceding the B indicates the size of fire in square feet that an ordinary user should be able to extinguish. There is no additional rating for class C, as it only indicates that the extinguishing agent will not conduct electricity, and an extinguisher will never have a rating of just C.

- For additional US UL rating information see Fast Flow Extinguishers

Comparison of fire classes

American	European	UK	Australian/Asian	Fuel/heat source
Class A	Class A	Class A	Class A	Ordinary combustibles
Class B	Class B	Class B	Class B	Flammable liquids
	Class C	Class C	Class C	Flammable gases
Class C	Unclassified	Unclassified	Class E	Electrical equipment
Class D	Class D	Class D	Class D	Combustible metals
Class K	Class F	Class F	Class F	Cooking oil or fat

Installation

Fig 2.15: *A fire extinguisher fitted to the passenger seat of a car*

Fire extinguishers are typically fitted in buildings at an easily accessible location, such as against a wall in a high-traffic area. They are also often fitted to motor vehicles, watercraft, and aircraft - this is required by law in many jurisdictions, for identified classes of vehicles. Under NFPA 10 all commercial vehicles must carry at least one fire extinguisher, with size/UL rating depending on type of vehicle and cargo (i.e., fuel tankers typically must have a 20 lb (9.1 kg), while most others can carry a 5 lb (2.3 kg)). The revised NFPA 10 created criteria on the placement of "fast flow extinguishers" in locations such as those storing and transporting pressurized flammable liquids and pressurized flammable gas or areas with possibility of three dimensional class B hazards are required to have "fast flow extinguishers" as required by NFPA 5.5.1.1. Varying classes of competition vehicles require fire extinguishing systems, the simplest requirements being a 1A:10BC hand-held portable extinguisher mounted to the interior of the vehicle.

The height limit for installation, as determined by the National Fire Protection Association (NFPA), is 60 in (1.5 m) for fire extinguishers weighing less than 40 lb (18 kg). However, compliance with the Americans with Disabilities Act (ADA) also needs to be followed within the United States. The ADA height limit of the fire extinguisher, as measured at the handle, is 48 in (1.2 m). Fire extinguisher installations are also limited to protruding no more than 4 inches into the adjacent path of travel. The ADA rule states that any object adjacent to a path of travel cannot project more than 4 in (10 cm) if the object's bottom leading edge is higher than 27 in (0.69 m). The 4-inch protrusion rule was designed to protect people with low-vision and those who are blind. The height limit rule of 48 in is primarily related to access by people with wheelchairs, but it is also related to other disabilities as well. Prior to 2012, the height limit was 54 in (1.4 m) for side-reach by wheel chair accessible installations. Installations made prior to 2012 at the 54-inch height are not required to be changed.

Types of extinguishing agents

Dry chemical

Fig 2.16: *A small, disposable sodium bicarbonate dry chemical unit intended for home kitchen use.*

Fig 2.17**:** *A typical dry chemical extinguisher containing 5 lb (2.3 kg). of monoammonium phosphate dry chemical.*

Fig 2.18: A *10 lb (4.5 kg) stored pressure purple-K fire extinguisher*

Fig 2.19: *An 18 lb (8.2 kg) US Navy cartridge-operated purple-K dry chemical (potassium bicarbonate) extinguisher.*

Fig 2.20: Met-*L-Kyl cartridge-operated fire extinguisher for pyrophoric liquid fires.*

This is a powder based agent that extinguishes by separating the four parts of the fire tetrahedron. It prevents the chemical reactions involving heat, fuel, and oxygen (combustion), thus extinguishing the fire. During combustion, the fuel breaks down into free radicals, which are highly reactive fragments of molecules that react with oxygen. The substances in dry chemical extinguishers can stop this process.

Monoammonium phosphate, also known as *tri-class*, *multipurpose*, or *ABC* dry chemical, used on class A, B, and C fires. It receives its class A rating from the agent's ability to melt and flow at 177 °C (351 °F) to smother the fire. More corrosive than other dry chemical agents. Pale yellow in color.

Sodium bicarbonate, *regular* or *ordinary* used on class B and C fires, was the first of the dry chemical agents developed. In the heat of a fire, it releases a cloud of carbon dioxide that smothers the fire. That is, the gas drives oxygen away from the fire, thus stopping the chemical reaction. This agent is not generally effective on class A fires because the agent is expended and the cloud of gas dissipates quickly, and if the fuel is still sufficiently hot, the fire starts up again. While liquid and gas fires do not usually store much heat in their fuel source, solid fires do. Sodium bicarbonate was very common in commercial kitchens before

the advent of wet chemical agents, but now is falling out of favor, as it is much less effective than wet chemical agents for class K fires, less effective than Purple-K for class B fires, and is ineffective on class A fires. White or blue in color.

Potassium bicarbonate (principal constituent of Purple-K), used on class B and C fires. About two times as effective on class B fires as sodium bicarbonate, it is the preferred dry chemical agent of the oil and gas industry. The only dry chemical agent certified for use in ARFF by the NFPA. Colored violet to distinguish it.

Potassium bicarbonate & Urea Complex (AKA Monnex), used on class B and C fires. More effective than all other powders due to its ability to decrepitate (where the powder breaks up into smaller particles) in the flame zone creating a larger surface area for free radical inhibition. Grey in color.

Potassium chloride, or Super-K, dry chemical was developed in an effort to create a high efficiency, protein-foam compatible dry chemical. Developed in the 60s, prior to Purple-K, it was never as popular as other agents since, being a salt, it was quite corrosive. For B and C fires, white in color.

Foam-compatible, which is a sodium bicarbonate (BC) based dry chemical, was developed for use with protein foams for fighting class B fires. Most dry chemicals contain metal stearates to waterproof them, but these will tend to destroy the foam blanket created by protein (animal) based foams. Foam compatible type uses silicone as a waterproofing agent, which does not harm foam. Effectiveness is identical to regular dry chemical, and it is light green in color (some ANSUL brand formulations are blue). This agent is generally no longer used since most modern dry chemicals are considered compatible with synthetic foams such as AFFF.

MET-L-KYL / PYROKYL is a specialty variation of sodium bicarbonate for fighting pyrophoric (ignites on contact with air) liquid fires. In addition to sodium bicarbonate, it also contains silica gel particles. The sodium bicarbonate interrupts the chain reaction of the fuel and the silica soaks up any unburned fuel, preventing contact with air. It is effective on other class B fuels as well. Blue/red in color.

Foams

Applied to fuel fires as either an aspirated (mixed and expanded with air in a branch pipe) or nonaspirated form to create a frothy blanket or seal over the fuel, preventing oxygen reaching it. Unlike powder, foam can be used to progressively extinguish fires without flashback.

Aqueous film-forming foam (AFFF), used on A and B fires and for vapor suppression. The most common type in portable foam extinguishers. AFFF was developed in the 1960s under

Project Light Water in a joint venture between 3M and the U.S. Navy. AFFF forms a film that floats out before the foam blanket, sealing the surface and smothering the fire by excluding oxygen. AFFF is widely used for ARFF firefighting at airports, often as a twin agent unit (TAU) with purple-K dry chemical.It contains fluoro-tensides which can be accumulated in the human body. The long-term effects of this on the human body and environment are unclear at this time. AFFF can be discharged through an air-aspirating branchpipe nozzle or a spray nozzle, and is now produced only in pre-mix form, where the foam concentrate is stored mixed with water. In the past, as solid charge model was produced, where the AFFF concentrate was housed as a dry compound in an external, disposable cartridge in a specially designed nozzle. The extinguisher body was charged with plain water, and the discharge pressure mixed the foam concentrate with the water upon squeezing the lever. These extinguishers received double the rating of a pre-mix model (40-B instead of 20-B), but are now considered obsolete, as parts and refill cartridges have been discontinued by the manufacturer.

Alcohol-resistant aqueous film-forming foams (AR-AFFF), used on fuel fires containing alcohol. Forms a membrane between the fuel and the foam preventing the alcohol from breaking down the foam blanket.

Film-forming fluoroprotein (FFFP) contains naturally occurring proteins from animal by-products and synthetic film-forming agents to create a foam blanket that is more heat resistant than the strictly synthetic AFFF foams. FFFP works well on alcohol-based liquids and is used widely in motorsports.

Compressed air foam system (CAFS): The CAFS extinguisher (example: TRI-MAX Mini-CAF) differs from a standard stored-pressure premix foam extinguisher in that it operates at a higher pressure of 140 psi, aerates the foam with an attached compressed gas cylinder instead of an air-aspirating nozzle, and uses a drier foam solution with a higher concentrate to water ratio. Generally used to extend a water supply in wildland operations. Used on class A fires and with very dry foam on class B for vapor suppression. These are very expensive, special purpose extinguishers typically used by fire departments or other safety professionals.

Arctic Fire is a liquid fire extinguishing agent that emulsifies and cools heated materials more quickly than water or ordinary foam. It is used extensively in the steel industry. Effective on classes A, B, and D.

FireAde, a foaming agent that emulsifies burning liquids and renders them non-flammable. It is able to cool heated material and surfaces similar to CAFS. Used on A and B (said to be effective on some class D hazards, although not recommended due to the fact that fireade still contains amounts of water which will react with some metal fires).

Cold Fire, is an organic, eco-friendly wetting agent that works by cooling, and by encapsulating the hydrocarbon fuel, which prevents it from entering into the combustion reaction. Bulk Cold Fire is used in booster tanks and is acceptable for use in CAFS systems. Cold Fire is UL listed for A and B fires only, though the manufacturer claims it is effective on class D and "grease" fires, which implies class K capability. End users should be cautious about agents use on fires outside of their UL listing, despite sales claims. Aerosol versions are preferred by users for cars, boats, RVs, and kitchens. Used primarily by law enforcement, fire departments, EMS, and the racing industry across North America. Cold Fire offers Amerex equipment (converted 252 and 254 models), as well as imported equipment in smaller sizes.

***Fig 2.21**: A 2.5 US gal (9.5 l) USCG-approved 2-1/2 gallon AFFF foam fire extinguisher*

Water types

Cools burning material. Very effective against fires in furniture, fabrics, etc. (including deep seated fires), and can be safely used only in the absence of electricity.

- Pump-Type water consists of a 2-1/2 or 5-gallon non-pressurized metal or plastic container with a pump mounted to it, and a discharge hose and nozzle. Pump type water extinguishers are often used where freezing conditions may occur, as they can be economically freeze-protected with calcium carbonate (except stainless steel models), such as barns, out buildings and unheated warehouses. They are also useful where many, frequent spot fires may occur, such as during fire watch for hot work operations. They are dependent on the user's strength to produce a decent discharge stream for firefighting. Water and antifreeze are the most common, but loaded stream and foam designs were made in the past. Backback models exist for wildland firefighting, and may be solid material such as metal or fiberglass, or collapsible vinyl or rubber bags for ease of storage.
- Air-pressurized water (APW) cools burning material by absorbing heat from burning material. Effective on class A fires, it has the advantage of being inexpensive, harmless, and relatively easy to clean up. In the United States, APW units contain 2.5 US gal (9.5 l)

of water in a tall, stainless steel cylinder. In Europe, they are typically mild steel, lined with polyethylene, painted red, containing 6–9 l (1.6–2.4 US gal) of water.

- Water mist (WM) uses a fine misting nozzle to break up a stream of de-ionized (distilled) water to the point of not conducting electricity back to the operator. Class A and C rated. It is used widely in hospitals and MRI facilities because it is both completely non-toxic and does not cause cardiac sensitization like some gaseous clean agents. These extinguishers come in 1-3/4 and 2-1/2 gallon sizes, painted white in the United States. Models used in MRI facilities are non-magnetic and are safe for use inside the room that the MRI machine is operating. Models available in Europe come in smaller sizes as well, and some even carry a Class F rating for commercial kitchens, essentially using steam to smother the fire and the water content to cool the oil.

Wet chemical and water additives

Wet chemical (potassium acetate, potassium carbonate, or potassium citrate) extinguishes the fire by forming an air-excluding soapy foam blanket over the burning oil through the chemical process of saponification (an alkali reacting with a fat to form a soap) and by the water content cooling the oil below its ignition temperature. Generally class A and K (F in Europe) only, although older models also achieved class B and C fire-fighting capability in the past, current models are rated A:K (Amerex, Ansul, Buckeye and Strike First) or K only (Badger/Kidde).

- Wetting agents: Detergent based additives used to break the surface tension of water and improve penetration of class A fires.

- Antifreeze chemicals added to water to lower its freezing point to about −40 °F (−40 °C). Has no appreciable effect on extinguishing performance. Can be glycol based or loaded stream, see below.

- Loaded Stream An alkali metal salt solution added to water to lower its freezing point to about −40 °F (−40 °C). Loaded stream is basically concentrated wet chemical, discharged through a straight stream nozzle, intended for class A fires. In addition to lowering the freezing point of the water, loaded stream also increases penetration into dense class A materials, and will give a slight class B rating (rated 1-B in the past), though current loaded stream extinguishers are rated only 2-A. Loaded Stream is very corrosive, and extinguishers containing this agent must be recharged annually to check for corrosion.

Halons, Halon-replacement clean agents and carbon dioxide

Clean agents extinguish fire by displacing oxygen (CO_2 or inert gases), removing heat from the combustion zone (Halotron-1, FE-36, Novec 1230) or inhibiting the chemical chain reaction (Halons). They are referred to as clean agents because they do not leave any residue

after discharge which is ideal for protecting sensitive electronics, aircraft, armored vehicles and archival storage, museums, and valuable documents.

- Halon (including Halon 1211 and Halon 1301), are gaseous agents that inhibit the chemical reaction of the fire. Classes B:C for 1301 and smaller 1211 fire extinguishers (2.3 kg; under 9 lbs) and A:B:C for larger units (9–17 lb or 4.1–7.7 kg). Halon gases are banned from new production under the Montreal Protocol, as of January 1, 1994 as its properties contribute to ozone depletion and long atmospheric lifetime, usually 400 years. Halon may be recycled and used to fill newly manufactured cylinders, however, only Amerex continues to do this. The rest of the industry has moved to halon alternatives, nevertheless, halon 1211 is still vital to certain military and industrial users, so there is a need for it.

Halon was completely banned in Europe and Australia except for critical users like law enforcement and aviation, resulting in stockpiles either being destroyed via high heat incineration or being sent to the United States for reuse. Halon 1301 and 1211 are being replaced with new halocarbon agents which have no ozone depletion properties and low atmospheric lifetimes, but are less effective. Halon 2402 is a liquid agent (dibromotetrafluoroethane) which has had limited use in the West due to its higher toxicity than 1211 or 1301. It is widely used in Russia and parts of Asia, and it was used by Kidde's Italian branch, marketed under the name "Fluobrene".

- Halocarbon replacements, HCFC Blend B (Halotron I, American Pacific Corporation), HFC-227ea (FM-200, Great Lakes Chemicals Corporation), and HFC-236fa (FE-36, DuPont), have been approved by the FAA for use in aircraft cabins in 2010. Considerations for halon replacement include human toxicity when used in confined spaces, ozone depleting potential, and greenhouse warming potential. The three recommended agents meet minimum performance standards, but uptake has been slow because of disadvantages. Specifically, they require two to three times the concentration to extinguish a fire compared with Halon 1211. They are heavier than halon, require a larger bottle because they are less effective, and have greenhouse gas potential. Research continues to find better alternatives.

- CO_2, a clean gaseous agent which displaces oxygen. Highest rating for 20 lb (9.1 kg) portable CO_2 extinguishers is 10B:C. Not intended for class A fires, as the high-pressure cloud of gas can scatter burning materials. CO_2 is not suitable for use on fires containing their own oxygen source, metals or cooking media. Although it can be rather successful on a person on fire, its use should be avoided where possible as it can cause frostbite and suffocation.

- Novec 1230 fluid (AKA *dry water*, or Saffire fluid), a fluorinated ketone that works by removing massive amounts of heat. Available in fixed systems and wheeled units in the US and in portables in Australia. Unlike other clean agents, this one has the advantage of being a liquid at atmospheric pressure, and can be discharged as a stream or a rapidly vaporizing mist, depending on application.
- Potassium aerosol particle-generator, contains a form of solid potassium salts and other chemicals referred to as aerosol-forming compounds (AFC). The AFC is activated by an electric current or other thermodynamic exchange which causes the AFC to ignite. The majority of installed currently are fixed units due to the possibility of harm to the user from the heat generated by the AFC generator.
- E-36 Cryotec, a type of high concentration, high pressure wet chemical (potassium acetate and water), it is being used by the U.S. Military in applications like the Abrams tank to replace the aging halon 1301 units previously installed.

Fig 2.22: *Amerex 10lb. CO2 Fire Extinguisher, Circa 1989, USA*

Class D dry powder and other agents for metal fires

There are several class D fire extinguisher agents available; some will handle multiple types of metals, others will not.

- Sodium chloride (Super-D, Met-L-X, M28, Pyrene Pyromet* or METAL.FIRE.XTNGSHR) contains sodium chloride salt, which melts to form an oxygen-excluding crust over the metal. A thermoplastic additive such as nylon is added to allow the salt to more readily form a cohesive crust over the burning metal. Useful on most alkali metals includingsodium and potassium, and other metals including magnesium, titanium, aluminum, and zirconium.
- Copper-based (Copper Powder Navy 125S) developed by the U.S. Navy in the 1970s for hard-to-control lithium and lithium-alloy fires. The powder smothers and acts as a heat sink to dissipate heat, but also forms a copper-lithium alloy on the surface which is non-

combustible and cuts off the oxygen supply. Will cling to a vertical surface. Lithium only.

- Graphite-based (G-Plus, G-1, Lith-X, Chubb Pyromet or METAL.FIRE.XTNGSHR) contains dry graphite that smothers burning metals. The first type developed, designed for magnesium, works on other metals as well. Unlike sodium chloride powder extinguishers, the graphite powder fire extinguishers can be used on very hot burning metal fires such as lithium, but unlike copper powder extinguishers will not stick to and extinguish flowing or vertical lithium fires. Like copper extinguishers, the graphite powder acts as a heat sink as well as smothering the metal fire.

- Sodium carbonate-based (Na-X) is used where stainless steel piping and equipment could be damaged by sodium chloride-based agents to control sodium, potassium, and sodium-potassium alloy fires. Limited use on other metals. Smothers and forms a crust.

- Ternary eutectic chloride (T.E.C.) dry powder is a dry powder developed in the 1960s by John Kerr Co. of England. It consists of a mixture of three powdered salts: sodium, potassium and barium chloride. T.E.C. forms an oxygen-excluding layer of molten salt on the metal's surface. Along with Met-L-X (sodium chloride), T.E.C has been reported to be one of the most effective agents (along with Met-L-X {sodium chloride}) for use on sodium, potassium, and NaK fires, and is used specifically on atomic metals like uranium and plutonium as it will not contaminate the valuable metal unlike other agents. T.E.C. is quite toxic, due to the barium chloride content, and for this reason is no longer used in the UK, and was never used in the US aside from radioactive material handling glove boxes, where its toxicity was not an issue due their confined nature. T.E.C. is still widely used in India, despite toxicity, while the West uses chiefly sodium chloride, graphite, and copper types of powder and considers T.E.C. obsolete.

- Trimethoxyboroxine(TMB)liquid is a boron compound dissolved in methanol to give it proper fluidity and allow it to be discharged from a portable fire extinguisher. It was developed in the late 1950s by the U.S. Navy for use on magnesium fires, especially crashed aircraft and aircraft wheel fires from hard landings. It is unique as an extinguishing agent in that the agent itself is a flammable liquid. When TMB contacts the fire, the methanol ignites and burns with a greenish flame due to the boron. As the methanol burns off, a glassy coating of boric oxide is left on the surface of the metal, creating an air-excluding crust. These extinguishers were made by the Ansul Chemical Co. utilizing TMB agent manufactured by the Callery Chemical Company, and were modified 2.5-gallon water extinguishers (Ansul used re-branded Elkhart extinguishers at the time), with a variable-stream nozzle that could deliver a straight stream or spray at the squeeze of a lever. A 6-inch fluorescent orange band with the letters "TMB" stenciled in black identified TMB from other extinguishers. This agent was problematic in that it had

a shelf life of only six months to a year once the extinguisher was filled, since the methanol is extremely hydroscopic (absorbs moisture from the air), which causes corrosion to the extinguisher and renders its use on fire dangerous. These extinguishers were used from the 1950s-70s in various applications, such as the MB-1 and MB-5 crash trucks. The current SOP is to use water fog and cool/burn out the burning metal.

- TMB was used experimentally by the US Air Force, specifically with regard to B-52 engine assemblies, and was tested in modified 10-gallon wheeled CBM extinguishers. Other agents were added to suppress the methanol flare up, such as chlorobromomethane (CBM), Halon 2402, and Halon 1211, with varied success. Halon 1211 was the most successful, and the combined TMB pressurized with halon 1211 and nitrogen was called Boralon was used experimentally by the Los Alamos National Laboratory for use on atomic metals, using sealed cylinder extinguishers made by Metalcraft and Graviner which eliminated the moisture contamination problem. TMB/Boralon was abandoned in favor of more versatile agents, though it is still mentioned in most US firefighting literature.

- Buffalo M-X liquid was a short-lived oil-based extinguishing agent for magnesium fires, made by Buffalo in the 1950s. It was discovered by the Germans in WWII that a heavy oil could be applied to burning magnesium chips to cool and smother them, and was easy to apply from a pressurized extinguisher, which was made by the German firm Total. After the war, the technology grab was all-encompassing, and fire extinguishers were no exception.

Buffalo marketed a 2.5-gallon and 1-quart extinguisher using M-X liquid discharged through a low-velocity shower head type nozzle, but it was met with limited success, as it was going up against Ansul's Met-L-X, which could be used on more types of metals and was non-combustible. M-X had the advantage of being easy to recharge and non-corrosive, since it was oil-based, but production did not last long due to its limited applications.

- Some water-based suppressants may be used on certain class D fires, such as burning titanium and magnesium. Examples include the Fire Blockade and FireAde brands of suppressant. Some metals, such as elemental lithium, will react explosively with water, therefore water-based chemicals should never be used on such fires due to the possibility of a violent reaction.

Most class D extinguishers will have a special low-velocity nozzle or discharge wand to gently apply the agent in large volumes to avoid disrupting any finely divided burning materials. Agents are also available in bulk and can be applied with a scoop or shovel.

Note. "Pyromet" is a trade name that refers to two separate agents. Invented by Pyrene Co. Ltd. (UK) in the 1960s, it was originally a sodium chloride formulation with monoammonium

phosphate, protein, clay and waterproofing agents. Modern Pyromet made by Chubb Fire is a graphite formulation.

***Fig** 2.23:Ansul Met-L-X 30lb. cartridge-operated sodium chloride dry powder*

Fire extinguishing ball

Several modern ball or grenade-style extinguishers are on the market. They are manually operated by rolling or throwing into a fire. The modern version of the ball will self-destruct once in contact with flame, dispersing a cloud of ABC dry chemical powder over the fire which extinguishes the flame. The coverage area is about 5 m^2 (54 sq ft). One benefit of this type is that it may be used for passive suppression. The ball can be placed in a fire prone area and will deploy automatically if a fire develops, being triggered by heat. Most modern extinguishers of this type are designed to make a loud noise upon deployment.

This technology is not new, however. In the 1800s, glass fire grenades filled with suppressant liquids were popular. These glass fire grenade bottles are sought by collectors. Some later brands, such as Red Comet, were designed for passive operation, and included a special holder with a spring-loaded trigger that would break the glass ball when a fusible link melted. As was typical of this era, some glass extinguishers contained the toxic carbon tetrachloride.

Condensed aerosol fire suppression

Condensed aerosol fire suppression is a particle-based form of fire extinction similar to gaseous fire suppression or dry chemical fire extinction. As with gaseous fire suppressants, condensed aerosol suppressants use clean agents to suppress the fire. The agent can be delivered by means of mechanical operation, electric operation, or combined electro-mechanical operation. To the difference of gaseous suppressants, which emit only gas, and dry chemical extinguishers, which release powder-like particles of a large size (25-150 μm) condensed aerosols are defined by the National Fire Protection Association as releasing finely divided solid particles (generally <10 μm), usually in addition to gas.

Whereas dry chemical systems must be directly aimed at the flame, condensed aerosols are flooding agents and therefore effective regardless of the location and height of the fire. Wet

chemical systems, such as the kind generally found in foam extinguishers, must, similarly to dry chemical systems, be sprayed directionally, onto the fire. Additionally, wet chemicals (such as potassium carbonate) are dissolved in water, whereas the agents used in condensed aerosols are microscopic solids.

Low-frequency sound

In 2015, researchers announced that high volume sound in the 30 to 60 hertz range drives oxygen away from the combustion surface, extinguishing the fire. One proposed application is to extinguish fires in outer space, with none of the clean-up required for mass-based systems.

Maintenance

Fig 2.24:*An empty fire extinguisher which was not replaced for years*.

Most countries in the world require regular fire extinguisher maintenance by a competent person to operate safely and effectively, as part of fire safety legislation. Lack of maintenance can lead to an extinguisher not discharging when required, or rupturing when pressurized. Deaths have occurred, even in recent times, from corroded extinguishers exploding.

There is no all-encompassing fire code in the United States. Generally, most municipalities (by adoption of the International Fire Code) require inspections every 30 days to ensure the unit is pressurized and unobstructed (done by an employee of the facility) and an annual inspection by a qualified technician. Hydrostatic pressure testing for all types of extinguishers is also required, generally every five years for water and CO_2 models up to every 12 years for dry chemical models.

Recently the National Fire Protection Association and ICC voted to allow for the elimination of the 30-day inspection requirement so long as the fire extinguisher is monitored electronically. According to NFPA, the system must provide record keeping in the form of an electronic event log at the control panel. The system must also constantly monitor an extinguisher's physical presence, internal pressure and whether an obstruction exists that could prevent ready access. In the event that any of the above conditions are found, the system must send an alert to officials so they can immediately rectify the situation. Electronic monitoring can be wired or wireless.

In the UK, three types of maintenance are required:

- Basic service: All types of extinguisher require a basic inspection annually to check weight, externally validate the correct pressure, and find any signs of damage or corrosion. Cartridge extinguishers are to be opened up for internal inspection, and to have the weight of the cartridge tested. Labels must be inspected for legibility, and where possible, dip tubes, hoses and mechanisms must be tested for clear, free operation.
- Extended service: Water, wet chemical, foam, and powder extinguishers require a more detailed examination every five years, including a test discharge and recharge. On stored pressure extinguishers, this is the only opportunity to internally inspect for damage/corrosion.
- Overhaul: CO_2 extinguishers, due to their high operating pressure, are subject to pressure vessel safety legislation, and must be hydraulic pressure tested, inspected internally and externally, and date stamped every 10 years. As it cannot be pressure tested, a new valve is also fitted. If any part of the extinguisher is replaced with a part from another manufacturer, then the extinguisher will lose its fire rating.

In the United States, there are 3 types of service:

- Maintenance inspection: All types of extinguishers should be inspected at least once a year. The extinguisher is checked that it has the correct volume and pressure of extinguishing agent, that it is within the required hydrotest and internal maintenance intervals, that it is in good condition, and that all external parts are still serviceable. Dry chemical and dry powder types may also be hit on the bottom with a rubber mallet to make sure the powder is free-flowing. After inspection, the tech will attach a new tamper seal and yearly service tag around the pin.
- Internal maintenance:
    - Water - annually (some states) or 5 years (NFPA 10, 2010 edition)
    - Foam - every 3 years

- Wet chemical, and CO_2 - every 5 years
- Dry chemical and dry powder- every 6 years
- Halon and clean agents - every 6 years.
- Cartridge-operated dry chemical or dry powder - annually
- Stored-pressure dry chemical mounted on vehicles - annually

The extinguisher is emptied of its chemical and pressure to check for proper operation. All components are disassembled, inspected, cleaned, lubricated, or replaced if defective. Liquid agents are replaced at this time, dry agents may be re-used if in good condition, halon is recovered and re-used, but CO_2 is discharged into the atmosphere. The extinguisher is then re-filled and recharged, after a "verification of service" collar is placed around the cylinder neck. It is impossible to properly install or remove a collar without depressurizing the extinguisher.

Note: Cartridge-operated extinguishers should be visually examined, but do not require a verification of service collar.

- Hydrostatic testing: Water, foam, wet chemical, and CO_2, every 5 years. Dry chemical, dry powder, halon, and clean agents, every 12 years.

Note: these are the required intervals for normal service conditions, if the extinguisher has been exposed to excessive heat, vibration, or mechanical damage it may need to be tested sooner.

The agent is emptied and depressurized and the valve is removed. After a thorough internal and external visual inspection, the cylinder is filled with water, placed inside a safety cage, and pressurized to the specified test pressure (varies with the type, age, and cylinder material) for the specified time period. If no failure, bulges, or leaks are detected, the cylinder passes. The cylinder is then emptied of water and thoroughly dried, and labeled with the test date and company that performed the test. CO_2 types have the test information stamped on the cylinder, all other types get a sticker on the back of the cylinder. Once dry, the units are recharged. Unlike the UK, the US does not rebuild extinguishers and replace valves at specific intervals unless parts are found to be defective, with the exception of halon. Halon types are often given new o-rings and valve stems at every internal maintenance to minimize any leakage potential.

OEM equipment must be used for replacement parts for the extinguisher to maintain its UL rating. If parts are unavailable, replacement is recommended, keep in mind extinguishers have a projected service life of about 25–35 years, although many are of such quality that they can outlast this, but realize that science is ever-changing, and something that was the best available 30 years ago may not be acceptable for modern fire protection needs.

2.12 BASIC FIRST AID FOR BURNS AND CUTS

Treatment for Burns and Scalds

Burns and scald can be caused by dry and moist heat, radiation or by chemicals. A superficial burn causes redness and discolouration and can also result in the formation of blisters. A deep burn destroys skin or muscle cells. The following are some methods of treating superficial burns;

- Submerging the whole area in cold water to stop further burning
- Covering the burnt area with a clean dry cloth.

The following measures can be taken for burns

- Remove or cut away clothing form the burned area
- Wash the area thoroughly with cold water
- Cover the burnt area with a sterile cloth from the first aid box
- Do not use ointments, Salt, spray
- Elevate burnt feet ,legs or arms and sit the victim up if the burns are on the face
- Keep a check on breathing
- Avoid breaking blisters or removing shreds of skin.

PREVENTION OFFALLS AND ADMINISTERING FIRST AID FOR ELECTRIC SHOCK

The following must be kept in mind to prevent falls

- Keep walking area clear of obstructions
- Keep the drawers and oven doors closed
- Pick up things immediately after they are dropped
- Always look where you are walking
- Never run in the kitchen

- Keep floors dry and free of grease spills, wet spots and wipe up
- Warn people when passing around blind corners

The following must be kept in mind while administering first aid for electric shocks;

- Switch off power supply and take out the plug.
- Do not touch the victim until the power has been turned off; use a dry insulating material such as wood, rubber or a folded newspaper, to push the victim away from contact with the current.
- Feel for the pulse and check if the patient is breathing. If there is no pulse and breathing, start external cardiac compression and expired air resuscitation. If the pulse is present, but breathing has stopped, start mouth to mouth resuscitation. Do not leave the victim until medical help arrives.

2.14 END QUESTIONS

The following questions should help you prepare for the End Examinations. These questions are for 5 marks each and should take you 11 minutes under examination conditions.

1. Describe what is meant by kitchen equipments
2. Classify the kitchen equipments
3. Describe various types of kitchen equipments
4. Explain how the various kitchen equipments are used
5. Explain how various kitchen equipments are maintained and stored
6. Describe the kitchen tools
7. Describe various types of knives used in professional kitchens
8. Explain how various types of knives are maintained
9. Describe what is meant by workstations
10. Describe various safety procedures used in a kitchen
11. Explain various types of fuel
12. Explain how various types of fuel are used
13. Describe the safety measures to be taken up in use of various types of fuel
14. Describe the various types of fires and how they are to be handled

15. Describe various types of fire extinguishers
16. Explain the first aid processes for burns
17. Discuss how the cuts in accidents at kitchen are to be handled.

2.15 REFERENCE

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UNIT 3 INGEDIENTS USED IN COOKING

Structure:

3.0 BEFORE WE BEGIN

We have seen in the previous units what is meant by professional kitchen, what is the functions of the various chefs, what the various departments in the kitchen are. We also saw what the various equipments which are used in the kitchen and how to take care of them. We learned about various types of fuel, types of fire and fire extinguishers. We learned what should be done in case of accidents and how first aid can be administered in cases of injuries.

In the present unit we will learn about the consumables which we use in kitchen. These consumables include herbs, spices, cereals, pulses, fruits, vegetable, salts, sweeteners, fats, milks and milk products. It is very important to know about these consumables as a professional kitchen worker. We should know what are the charecteristics of these ingredients. What is good for health of the consumer and what is harmful. Which ingredients cause allergies or are likely to cause health problems is a piece of information which is very cruicial for the career of a professional hospitality expert. It is mandatory for food products in many contrues to have labels on their nutritional values. As professional kitchen worker, you would be required to advice your customers which oil not to consume if they have risk of heart decease. Hence, the present unit would try to equip you with such knowledge on consumables. We would focus on the culinary uses of the herbs, spices, cereals, pulses, fruits, vegetable, salts, sweeteners, fats, milks and milk products. We would also provide you with the information on the nutricinay values of the

various food products. We have chosen the ingredients which are available in India or are of significance to the international cuisine,

3.1 UNIT OBJECTIVES:

After studying this unit you will be able to

- ✓ Describe the various kinds of ingredients used in cooking.
- ✓ List various types of herbs.
- ✓ List various examples of spices.
- ✓ Describe cereals and pulses and their importance in food,
- ✓ Explain how fruits and vegetables are used in kitchen,
- ✓ Describe how salts and sweeteners are used in cooking
- ✓ Describe fats and how they are treated in kitchen.
- ✓ List types of milk products
- ✓ Describe the purchase processes for the ingredients
- ✓ Describe how various ingredients are stored in kitchen

3.2 HERBS AND SPICES AND THEIR CULINARY USES

We will begin our quest to understand the ingredients used in the professional kitchen with the hearbs and their culinary uses. We will focus on the ingredients which are available in India or those which have significant use in the international cuisines.

3.2.1 Ajwain

Fig 3.01: *Ajwain Fruits (Commonly mistaken as seeds)*

The small fruits are pale brown schizocarps and have an oval shape, resembling caraway and cumin. It has a bitter and pungent taste, with a flavor similar to anise and oregano. They smell almost exactly like thyme because it also contains thymol, but is more aromatic and less subtle in taste, as well as slightly bitter and pungent. Even a small number of fruits tends to dominate the flavor of a dish.

Culinary uses

The fruits are rarely eaten raw; they are commonly dry-roasted or fried in ghee (clarified butter). This allows the spice to develop a more subtle and complex aroma. In Indian cuisine, it is often part of a vaghaar (Gujarati: વઘાર), a mixture of spices fried in oil or butter, which is used to flavor lentil dishes. In Afghanistan, the fruits are sprinkled over bread and biscuits.

3.2.2 Basil (Sabja)

Basil is possibly native to India, and has been cultivated there for more than 5,000 years. It was thoroughly familiar to the Greek authors Theophrastus and Dioscorides. It is a hardy annual plant, best known as a culinary herb prominently featured in Italian cuisine, and also plays a major role in Southeast Asian cuisines of Indonesia, Thailand, Malaysia, Vietnam, Cambodia, Laos, and Taiwan. Depending on the species and cultivar, the leaves may taste somewhat like anise, with a strong, pungent, often sweet smell.

Fig 3.02: *Basil plant*

There are many varieties of Ocimum basilicum, as well as several related species or species hybrids also called basil. The type used in Italian food is typically called sweet basil (or Genovese basil), as opposed to Thai basil (O. basilicum var. thyrsiflora), lemon basil (O. X citriodorum), and holy basil (Ocimum tenuiflorum), which are used in Asia. While most common varieties of basil are treated as annuals, some are perennial in warm, tropical climates, including holy basil and a cultivar known as "African blue".

To date, there are no scientifically established health benefits of consuming basil leaves or oil.

Culinary use

Basil is most commonly used fresh in cooked recipes. In general, it is added at the last moment, as cooking quickly destroys the flavor. The fresh herb can be kept for a short time in plastic bags in the refrigerator, or for a longer period in the freezer, after being blanched quickly in boiling water. The dried herb also loses most of its flavor, and what little flavor remain tastes very different, with a weak coumarin flavor, like hay.

In Taiwan, people add fresh basil leaves to thick soups. They also eat fried chicken with deep-fried basil leaves. Basil (most commonly Thai basil) is commonly steeped in cream or milk to create an interesting flavor in ice cream or chocolates (such as truffles). The leaves are not the only part of basil used in culinary applications, the flower buds have a more subtle flavor and they are edible.

Seeds

When soaked in water, the seeds of several basil varieties become gelatinous, and are used in Asian drinks and desserts such as faluda, sharbat-e-rihan, or hột é.

3.2.3 Black cardamom

Black cardamom, also known as hill cardamom, Bengal cardamom, greater cardamom, Indian cardamom, Nepal cardamom, winged cardamom, or brown cardamom, comes from either of two species in the family Zingiberaceae. Its seed pods have a strong camphor-like flavor, with a smoky character derived from the method of drying.

he pods are used as a spice, in a similar manner to the green Indian cardamom pods, but with a different flavor. Unlike green cardamom, this spice is rarely used in sweet dishes. Its smoky flavor and aroma derive from traditional methods of drying over open flames.

Culinary uses

Black cardamom is often erroneously described as an inferior substitute for green cardamom by those unfamiliar with the spice; actually, it is just not as well suited for the sweet/hot dishes which typically include cardamom, and that are more commonly prepared outside the plant's native range. Black cardamom, by contrast, is better for hearty meat stews and similar dishes. Although the flavor differs from the smaller green cardamom, black cardamom is sometimes used by large-scale commercial bakers because of its low cost.

In China, the pods are used for jin-jin braised meat dishes, particularly in the cuisine of the central-western province of Sichuan. The pods are also often used in Vietnam, where they are called thảo quả and used as an ingredient in the broth for the noodle soup called phở.

The largest producer of the black cardamom is Nepal, followed by India and Bhutan. In traditional Chinese medicine, black cardamom is used for stomach disorders and malaria.

Check your Progress:

1. What is the common misunderstanding about ajwain?
2. What is one of the ingredients in faluda and sherbet like Sherbet-e-rihan?
3. Which herb is used as a tradional medicine for stomack disorder and malaria in China?

3.2.4 Black pepper

Black pepper (Piper nigrum) is a flowering vine in the family Piperaceae, cultivated for its fruit, which is usually dried and used as a spice and seasoning. When dried, the fruit is known as a peppercorn. When fresh and fully mature, it is approximately 5 millimetres (0.20 in) in diameter, dark red, and, like all drupes, contains a single seed. Peppercorns, and the ground pepper derived from them, may be described simply as pepper, or more precisely as black pepper (cooked and dried unripe fruit), green pepper (dried unripe fruit) and white pepper (ripe fruit seeds).

Black pepper is native to south India and is extensively cultivated there and elsewhere in tropical regions. Currently, Vietnam is the world's largest producer and exporter of pepper, producing 34% of the world's Piper nigrum crop as of 2013.

Dried ground pepper has been used since antiquity for both its flavor and as a traditional medicine. Black pepper is the world's most traded spice. It is one of the most common spices added to cuisines around the world. The spiciness of black pepper is due to the chemical piperine, not to be confused with the capsaicin characteristic of chili peppers. Black pepper is ubiquitous in the modern world as a seasoning and is often paired with salt.

3.2.5 Black mustard (Marathi: काळी मोहरी, Kali Mohari)

The plant is believed to be native to the southern region of Europe and possibly South Asia where it has been cultivated for thousands of years.

The spice is generally made from ground seeds of the plant, with the seed coats removed. The small (1 mm) seeds are hard and vary in color from dark brown to black. They are flavorful, although they have almost no aroma. The seeds are commonly used in Indian cuisine, for example in curry, where it is known as rai. The seeds are usually thrown into hot oil or ghee, after which they pop, releasing a characteristic nutty flavor. The seeds have a significant amount of fatty oil. This oil is used often as cooking oil in India.

In Ethiopia, where it is cultivated as a vegetable in Gondar, Harar and Shewa, the shoots and leaves are consumed cooked and the seeds used as a spice. Its Amharic name is senafitch.

Ground seeds of the plant mixed with honey are widely used in Eastern Europe as cough suppressant. In Eastern Canada, the use of mouche de moutarde to treat respiratory infections was popular before the advent of modern medicine. It consisted in mixing ground mustard seeds with flour and water, and creating a cataplasm with the paste. This cataplasm was put on the chest or the back and left until the person felt a stinging sensation.

The plant itself can grow from two to eight feet tall, with racemes of small yellow flowers. These flowers are usually up to 1/3" across, with four petals each. The leaves are covered in small hairs; they can wilt on hot days, but recover at night.

Since the 1950s, black mustard has become less popular as compared to India mustard because some cultivars of India mustard have seeds that can be mechanically harvested in a more efficient manner.

3.2.6 Cardamom (इलायची)

Cardamom (/ˈkɑːrdəməm/), sometimes Cardamon or Cardamum, is a spice made from the seeds of several plants in the genera Elettaria and Amomum in the family Zingiberaceae. Both genera are native to India (the largest producer until the late 20th century), Pakistan, Bangladesh, Bhutan, Indonesia and Nepal. They are recognized by their small seed pods, triangular in cross-section and spindle-shaped, with a thin, papery outer shell and small black seeds.

It is the world's third-most expensive spice, surpassed in price per weight only by vanilla and saffron.

Uses

Both forms of cardamom are used as flavorings and cooking spices in both food and drink, and as a medicine. E. cardamomum (green cardamom) is used as a spice, and in medicine; it is also smoked.

Besides use as flavourant and spice in foods, cardamom-flavoured tea, also flavoured with cinnamon, is consumed as a hot beverage in Bangladesh, India and Pakistan.

Cardamom has a strong, unique taste, with an intensely aromatic, resinous fragrance. Black cardamom has a distinctly more smokey, though not bitter, aroma, with a coolness some consider similar to mint.

Green cardamom is one of the most expensive spices by weight, but little is needed to impart flavor. It is best stored in pod form because once the seeds are exposed or ground, they quickly lose their flavor. Grinding the pods and seeds together lowers both the quality and the price. For recipes requiring whole cardamom pods, a generally accepted equivalent is 10 pods equals 1 1⁄2 teaspoons of ground cardamom.

It is a common ingredient in Indian cooking. It is also often used in baking in the Nordic countries, in particular in Sweden and Finland, where it is used in traditional treats such as the Scandinavian Jule bread Julekake, the Swedish kardemummabullar sweet bun, and Finnish sweet bread pulla. In the Middle East, green cardamom powder is used as a spice for sweet dishes, as well as traditional flavouring in coffee and tea. Cardamom is used to a wide extent in savoury dishes. In some Middle Eastern countries, coffee and

cardamom are often ground in a wooden mortar, a mihbaj, and cooked together in a skillet, a mehmas, over wood or gas, to produce mixtures as much as 40% cardamom.

Fig. 303: *Green Cardamom*

In Asia both types of cardamom are widely used in both sweet and savory dishes, particularly in the south. Both are frequent components in spice mixes, such as Indian and Nepali masalas and Thai curry pastes. Green cardamom is often used in traditional Indian sweets and in masala chai (spiced tea). Both are also often used as a garnish in basmati rice and other dishes. Individual seeds are sometimes chewed and used in much the same way as chewing gum. It is used by confectionery giant Wrigley; its Eclipse Breeze Exotic Mint packaging indicates the product contains "cardamom to neutralize the toughest breath odors". It is also included in gin and herbal teas.

Check your Progress:

1. Which type of cardamom is used in masala chai in India?
2. Which are three most expensive herbs in the world by weight?
3. Which is the largest producer of Black pepper in the world?

3.2.7 Chili pepper

The chili pepper (also chile pepper or chilli pepper, from Nahuatl chīlli is the fruit of plants from the genus Capsicum. In Australia, Britain, India, Ireland, New Zealand, Pakistan, South Africa and in other Asian countries, it is usually known simply as chilli.

Fig 3.04: *Madame_Jeanette_and_other_chillie*

The substances that give chili peppers their intensity when ingested or applied topically are capsaicin and several related chemicals, collectively called capsaicinoids.

Worldwide, some 3.8 million hectares (about 9.4 million acres) of land produce 33 million tons of chili peppers (2010 data). India is the world's biggest producer, consumer and exporter of chili peppers. Guntur in the South Indian state of Andhra Pradesh produces 30% of all the chilies produced in India. Andhra Pradesh as a whole contributes 75% of India's chili exports.

Culinary uses

Fig 3.05: *Green Chilies*

- Thai curry pastes contain large amounts of chilies
- Chili pepper pods, which are berries, are used fresh or dried. Chilies are dried to preserve them for long periods of time, which may also be done by pickling.
- Dried chilies are often ground into powders, although many Mexican dishes including variations on chiles rellenos use the entire chili. Dried whole chilies may be reconstituted before grinding to a paste. The chipotle is the smoked, dried, ripe jalapeño.
- Many fresh chilies such as poblano have a tough outer skin that does not break down on cooking. Chilies are sometimes used whole or in large slices, by roasting, or other means of blistering or charring the skin, so as not to entirely cook the flesh beneath. When cooled, the skins will usually slip off easily.
- The leaves of every species of Capsicum are edible. Though almost all other Solanaceous crops have toxins in their leaves, chili peppers do not. The leaves, which are mildly bitter and nowhere near as hot as the fruit, are cooked as greens in Filipino cuisine, where they are called dahon ng sili (literally "chili leaves"). They are used in the chicken soup tinola. In Korean cuisine, the leaves may be used in kimchi. In Japanese cuisine, the leaves are cooked as greens, and also cooked in tsukudani style for preservation.
- Chili is by far the most important fruit in Bhutan. Local markets are never without chilies in different colors and sizes, in fresh and dried form. Bhutanese call this crop ema (in Dzongkha) or solo (in Sharchop). Chili is a staple fruit in Bhutan; the ema datsi recipe is entirely made of chili mixed with local cheese. Chili is also an important ingredient in almost all curries and food recipes in the country.
- In India, most households always keep a stack of fresh hot green chilies at hand, and use them to flavor most curries and dry dishes. It is typically lightly fried with oil in the initial stages of preparation of the dish. Some states in India, such as Rajasthan, make entire dishes only by using spices and chilies.
- Chilies are present in many cuisines. Some notable dishes other than the ones mentioned elsewhere in this article include:
- Curry dishes usually contain fresh or dried chillies.

- Fresh or dried chilies are often used to make hot sauce, a liquid condiment—usually bottled when commercially available—that adds spice to other dishes. Hot sauces are found in many cuisines including harissa from North Africa, chili oil from China (known as rāyu in Japan), and sriracha from Thailand.

3.2.8 Cinnamomum (tamala patra or Indian Bay Leaf)

Cinnamomum tamala, Indian bay leaf, also known as tejpat, tejapatta, Malabar leaf, Indian bark, Indian cassia, or malabathrum, is a tree within the Lauraceae family which is native to India, Bangladesh, Nepal, Bhutan, and China. It can grow up to 20 m (66 ft) tall. It has aromatic leaves which are used for culinary and medicinal purposes. It is thought to have been one of the major sources of the medicinal plant leaves known in classic and medieval times as malabathrum (or malobathrum).

Culinary Uses

Fig 3.06: *Young leaves*

The bark is also sometimes used for cooking, although it is regarded as inferior to true cinnamon or cassia. Methanolic extract of C. tamala leaves fed at 10 mg/kg to alloxan-induced diabetic rats for 15 days resulted in significant reduction in blood glucose level, blood glycosylated haemoglobin, LPO, serum AST, and ALT, and significant increase in the antioxidant enzymes such as CAT, GSH, and SOD. C. tamala could be used as an adjunct therapy in diabetes.

Fig 3.07: *Dried Indian bay leaves*

3.2.9 Clove

Cloves are the aromatic flower buds of a tree in the family Myrtaceae, Syzygium aromaticum. They are native to the Maluku Islands in Indonesia, and are commonly used as a spice. Cloves are commercially harvested primarily in Bangladesh, Indonesia, India, Madagascar, Zanzibar, Pakistan, Sri Lanka, and Tanzania. Cloves are available throughout the year.

Fig 3.08*: Dried cloves*

Uses

Cloves are used in the cuisine of Asian, African, and the Near and Middle East countries, lending flavor to meats, curries, and marinades, as well as fruit such as apples, pears or rhubarb. Cloves may be used to give aromatic and flavor qualities to hot beverages, often combined with other ingredients such as lemon and sugar. They are a common element in spice blends such as pumpkin pie spice and speculoos spices.

In Mexican cuisine, cloves are best known as clavos de olor, and often accompany cumin and cinnamon.

A major component of clove taste is imparted by the chemical eugenol, and the quantity of the spice required is typically small. It pairs well with cinnamon, allspice, vanilla, red wine and basil, as well as onion, citrus peel, star anise, or peppercorns.

Check your Progress:

1. Which spice is used to give aromatic and flavor qualities to meats, curries and hot beverages?
2. How can the bark of cinnamomam ?
3. How does the menthol extracts of tamal help in reducing blood sugar?

3.2.10 Coriander (Marathi:Dhaṇē, Hindi: Dhania)

Uses in Cooking

All parts of the plant are edible, but the fresh leaves and the dried seeds are the parts most traditionally used in cooking. Coriander is used in cuisines throughout the world.

Leaves

***Fig 3.09**: Coriander leaves*

The leaves are variously referred to as coriander leaves, fresh coriander, dhania, Chinese parsley, or (in the US and commercially in Canada) cilantro.

Coriander potentially may be confused with culantro (Eryngium foetidum L.), an apiacea-like coriander (Coriandrum sativum L.), but in a different genus. Culantro has a distinctly different spiny appearance, a more potent volatile leaf oil and a stronger aroma.

The leaves have a different taste from the seeds, with citrus overtones. However, some people find the leaves to have an unpleasant soapy taste or a rank smell and avoid them.

The fresh leaves are an ingredient in many South Asian foods (such as chutneys and salads); in Chinese and Thai dishes; in Mexican cooking, particularly in salsa and guacamole and as a garnish; and in salads in Russia and other CIS countries. Chopped coriander leaves are a garnish on Indian dishes such as dal. As heat diminishes their flavour, coriander leaves are often used raw or added to the dish immediately

before serving. In Indian and Central Asian recipes, coriander leaves are used in large amounts and cooked until the flavour diminishes. The leaves spoil quickly when removed from the plant, and lose their aroma when dried or frozen.

Fruits

Fig 3.10: *Dried coriander fruits, often called "coriander seeds" when used as a spice*

Fig 3.11*: Coriander roots*

The dry fruits are known as coriander seeds. The word "coriander" in food preparation may refer solely to these seeds (as a spice), rather than to the plant. The seeds have a lemony citrus flavour when crushed, due to terpenes linalool and pinene. It is described as warm, nutty, spicy, and orange-flavoured.

The variety C. s. vulgare has a fruit diameter of 3–5 mm (0.12–0.20 in), while var. C. s. microcarpum fruits have a diameter of 1.5–3 mm (0.06–0.12 in). Large-fruited types are grown mainly by tropical and subtropical countries, e.g. Morocco, India, and Australia, and contain a low volatile oil content (0.1-0.4%). They are used extensively for grinding and blending purposes in the spice trade. Types with smaller fruit are produced in temperate regions and usually have a volatile oil content around 0.4-1.8%, so are highly valued as a raw material for the preparation of essential oil.

Food applications

It is commonly found both as whole dried seeds and in ground form. Roasting or heating the seeds in a dry pan heightens the flavour, aroma, and pungency. Ground coriander seed loses flavour quickly in storage and is best ground fresh. Coriander seed is a spice in garam masala and Indian curries which often employ the ground fruits in generous amounts together with cumin, acting as a thickener in a mixture called dhana jeera.

Roasted coriander seeds, called dhana dal, are eaten as a snack. They are the main ingredient of the two south Indian dishes: sambhar and rasam.

Outside of Asia, coriander seed is used widely in the process for pickling vegetables. In Germany and South Africa (see boerewors), the seeds are used while making sausages. In Russia and Central Europe, coriander seed is an occasional ingredient in rye bread (e.g. Borodinsky bread), as an alternative to caraway.

The Zuni people of North America have adapted it into their cuisine, mixing the powdered seeds ground with chile and using it as a condiment with meat, and eating leaves as a salad.

Coriander seeds are used in brewing certain styles of beer, particularly some Belgian wheat beers. The coriander seeds are used with orange peel to add a citrus character.

3.211 Cumin (Marathi: Jeera, Hindi: Zeera)

Fig 3.12: *cumin seeds*

Uses

Cumin seed is used as a spice for its distinctive flavour and aroma. It is globally popular and an essential flavouring in many cuisines, particularly South Asian (where it is called jeera, Northern African, and Latin American cuisines. Cumin can be found in some cheeses, such as Leyden cheese, and in some traditional breads from France. It is commonly used in traditional Brazilian cuisine. Cumin can be an ingredient in chili powder (often Tex-Mex or Mexican-style), and is found in achiote blends, adobos, sofrito, garam masala, curry powder, and bahaarat. In Myanmar, cumin is used as a spice. In South Asian cooking, it is often combined with coriander seeds in a powdered mixture called dhana jeera.

Cumin can be used ground or as whole seeds. It helps to add an earthy and warming feeling to food, making it a staple in certain stews and soups, as well as spiced gravies such as chili. It is also used as an ingredient in some pickles and pastries

3.2.12 Curry tree (Marathi: Kadi patta)

Fig 3.13: *Curry Tree*

Uses

The leaves are highly valued as seasoning in southern and west-coast Indian cooking, and Sri Lankan cooking especially in curries, usually fried along with the chopped onion in the first stage of the preparation. They are also used to make thoran, vada, rasam and kadhi. In their fresh form, they have a short shelf life and do not keep well in the refrigerator. They are also available dried, though the aroma is largely inferior. Leaves can also be harvested from home-raised plants as it is also fairly easily grown in warmer areas of the world, or in containers where the climate is not supportive outdoors.

The leaves of Murraya koenigii are also used as an herb in Ayurvedic medicine.

Although most commonly used in curries, leaves from the curry tree can be used in many other dishes to add flavour. In Cambodia, Khmer toast the leaves in an open flame or roast it until crispy and then crush it into a soured soup dish called maju krueng.

Because of its aromatic characteristic properties, the plant has uses in soap making, body lotions, potpourri, scent, air fresheners, body fragrance, perfume, bath and massage oils, aromatherapy, towel scenting, spas and health clinics, incense, facial steams or hair treatments.

In the absence of tulsi leaves, curry leaves are used for rituals, such as pujas.

Check your Progress:

1. How are the coriander leaves used in cooking?
2. How would you use curry leaves in varios forms of cooking ?
3. Which are the culinary uses of the Cummins seeds?

3.2.13 Lemon Grass (Marathi: Gawati Chaha)

Fig 3.14: *Lemon Grass Plants*

Culinary uses

Cymbopogon citratus is abundant in the Philippines and Indonesia where it is known as tanglad or sereh. Its fragrant leaves are traditionally used in cooking, particularly for lechon and roasted chicken.

The dried leaves can also be brewed into a tea, either alone or as a flavoring in other teas, imparting a flavor reminiscent of lemon juice but with a mild sweetness without significant sourness or tartness.

3.2.14 Fenugreek (Marathi: Methi)

Fig 3.15: *Fenugreek*

Use

Fenugreek is used as an herb (dried or fresh leaves), spice (seeds), and vegetable (fresh leaves, sprouts, and microgreens). Sotolon is the chemical responsible for fenugreek's distinctive sweet smell. Cuboid-shaped, yellow- to amber-colored fenugreek seeds are frequently encountered in the cuisines of the Indian subcontinent, used both whole and powdered in the preparation of pickles, vegetable dishes, daals, and spice mixes such as panch phoron and sambar powder. They are often roasted to reduce bitterness and enhance flavor.

Fresh fenugreek leaves are an ingredient in some Indian curries. Sprouted seeds and microgreens are used in salads. When harvested as microgreens, fenugreek is known as samudra methi in Maharashtra, especially in and around Mumbai, where it is often grown near the sea in the sandy tracts, hence the name samudra, "ocean" in Sanskrit. Samudra methi is also grown in dry river beds in the Gangetic plains. When sold as a vegetable in India, the young plants are harvested with their roots still attached and sold in small bundles in the markets and bazaars. Any remaining soil is washed off to extend their shelf life.

In Turkish cuisine, fenugreek seeds are used for making a paste known as çemen. Cumin, black pepper, and other spices are added into it, especially to make pastırma.

In Egyptian cuisine, peasants in Upper Egypt add fenugreek seeds and maize to their pita bread to produce aish merahrah, a staple of their diet.

Fenugreek is used in Eritrean and Ethiopian cuisine. The word for fenugreek in Amharic is abesh (or abish), and the seed is used in Ethiopia as a natural herbal medicine in the treatment of diabetes.

3.2.15 Kokam (Garcinia indica)

Fig 3.16: *Kokam leaves, fruit*

Uses

The fresh fruit is preserved with sugar to make a bright-red syrup that is bottled for sale. The syrup is diluted with water to make a refreshing cordial.

Fig 3.17: *The dried skin of kokum fruits*

The outer cover of fruit is dried in the sun to get aamsul or kokam. It is also known as bhirand in Konkani and punarpuli/muragalu in Kannada. It is used as a staple souring agent typically in Goan cuisine and some parts of Maharashtra and Karnataka. Kokum yields a peculiar flavour and blackish red colour. As a souring agent, it is used as an alternative to tamarind in curries and other dishes from the Goa and Konkan region. It is also used in cuisine from Gujarat, where it is frequently used to add flavor and tartness to dal (lentil soup) for flavor balance, and parts of South India.It is extensively used in Assamese cuisine in many dishes like " masor tenga " or sour fish curry and " tenga dali " or sour dal. It is also used as a cure for upset stomach and colds. A few dry pieces are soaked in water for some time and then the pieces are mashed in the water itself and can be taken in whole.

Fig 3.18: *The vessel on the left contains syrup which is obtained from the vessel containing kokum rinds, on the right. The syrup is used to make kokum sherbet*

Kokum squash or kokum concentrate is used in preparing a drink (sherbet) which is bright red in colour.

Further, the extract/ concentrate of this fruit is called aagal in Konkani and Marathi. It is added during the preparation of solkadhi, along with coconut milk.

Check your Progress:

1. Describe the taste of lemon grass as used as flavoring agent in tea?
2. What is samudra medthi ?
3. Describe the various culinary uses of Kokam?

3.2.16 Garlic

Fig 3.19: *Garlic plant*

Culinary uses

Fig 3.20: *Garlic being crushed using a garlic press*

Garlic is widely used around the world for its pungent flavor as a seasoning or condiment.

The garlic plant's bulb is the most commonly used part of the plant. With the exception of the single clove types, garlic bulbs are normally divided into numerous fleshy sections called cloves. Garlic cloves are used for consumption (raw or cooked) or for medicinal purposes. They have a characteristic pungent, spicy flavor that mellows and sweetens considerably with cooking.

Other parts of the garlic plant are also edible. The leaves and flowers (bulbils) on the head (spathe) are sometimes eaten. They are milder in flavor than the bulbs, and are most often consumed while immature and still tender. Immature garlic is sometimes pulled, rather like a scallion, and sold as "green garlic". When green garlic is allowed to grow past the "scallion" stage, but not permitted to fully mature, it may produce a garlic "round", a bulb like a boiling onion, but not separated into cloves like a mature bulb. It imparts a garlic flavor and aroma in food, minus the spiciness. Green garlic is often chopped and stir-fried or cooked in soup or hotpot in Southeast Asian (i.e. Vietnamese, Thai, Lao, Cambodian, Singaporean) and Chinese cookery, and is very abundant and low-priced. Additionally, the immature flower stalks (scapes) of the hardneck and elephant types are sometimes marketed for uses similar to asparagus in stir-fries.

Inedible or rarely eaten parts of the garlic plant include the "skin" covering each clove and root cluster. The papery, protective layers of "skin" over various parts of the plant are generally discarded during preparation for most culinary uses, though in Korea immature whole heads are sometimes prepared with the tender skins intact. The root cluster attached to the basal plate of the bulb is the only part not typically considered palatable in any form.

Garlic is a fundamental component in many or most dishes of various regions, including eastern Asia, South Asia, Southeast Asia, the Middle East, northern Africa, southern Europe, and parts of South and Central America. The flavor varies in intensity and aroma with the different cooking methods. It is often paired with onion, tomato, or ginger. The parchment-like skin is much like the skin of an onion, and is typically removed before using in raw or cooked form. An alternative is to cut the top off the bulb, coat the cloves by dribbling olive oil (or other oil-based seasoning) over them, and roast them in an oven. Garlic softens and can be extracted from the cloves by squeezing the (root) end of the bulb, or individually by squeezing one end of the clove. In Korea, heads of garlic are heated over the course of several weeks; the resulting product, called black garlic, is sweet and syrupy, and is now being sold in the United States, United Kingdom and Australia.

Garlic may be applied to different kinds of bread, usually in a medium of butter or oil, to create a variety of classic dishes, such as garlic bread, garlic toast, bruschetta, crostini and canapé.

Garlic cloves pickled by simply storing them in vinegar in a refrigerator. This also yields garlic-infused vinegar to use in recipes or as a condiment.

Oils can be flavored with garlic cloves. These infused oils are used to season all categories of vegetables, meats, breads and pasta. Garlic, along with fish sauce, chopped fresh chilis, lime juice, sugar and water, is a basic essential item in dipping fish sauce, a highly used dipping sauce condiment used in Indochina. In East and Southeast Asia, chili oil with garlic is a popular dipping sauce, especially for meat and seafood. Tuong ot toi Viet Nam (Vietnam Chili Garlic Sauce) is a highly popular condiment and dip across North America and Asia.

In some cuisines, the young bulbs are pickled for three to six weeks in a mixture of sugar, salt, and spices. In eastern Europe, the shoots are pickled and eaten as an appetizer. Laba garlic, prepared by soaking garlic in vinegar, is a type of pickled garlic served with dumplings in northern China to celebrate the Chinese New Year.

Lightly smoked garlic is becoming increasingly popular in British and European cuisine. It is particularly prized for stuffing poultry and game, and in soups and stews. In both these cases it is important to utilize the undiscarded skin, as much of the smoke flavor is situated there, rather than in the cloves themselves.

Immature scapes are tender and edible. They are also known as "garlic spears", "stems", or "tops". Scapes generally have a milder taste than the cloves. They are often used in stir frying or braised like asparagus. Garlic leaves are a popular vegetable in many parts of Asia. The leaves are cut, cleaned, and then stir-fried with eggs, meat, or vegetables.

Mixing garlic with egg yolks and olive oil produces aioli. Garlic, oil, and a chunky base produce skordalia. Blending garlic, almond, oil, and soaked bread produces ajoblanco. Tzatziki, yogurt mixed with garlic and salt is a common sauce in Eastern Mediterranean cuisines.

Garlic powder has a different taste from fresh garlic. If used as a substitute for fresh garlic, 1/8 teaspoon of garlic powder is equivalent to one clove of garlic.

Storage

***Fig 3.21**: A basket of garlic bulbs.*

Domestically, garlic is stored warm above 18 °C (64 °F)] and dry to keep it dormant (lest it sprout). It is traditionally hung; softneck varieties are often braided in strands called plaits or grappes. Peeled cloves may be stored in wine or vinegar in the refrigerator. Commercially, garlic is stored at 0 °C (32 °F), in a dry, low-humidity environment. Garlic will keep longer if the tops remain attached.

Garlic is often kept in oil to produce flavored oil; however, the practice requires measures to be taken to prevent the garlic from spoiling. Untreated garlic kept in oil can support the growth of Clostridium botulinum which causes the deadly botulism illness; refrigeration will not assure the safety of garlic kept in oil. To reduce this risk, the oil should be refrigerated and used within one week. Commercially prepared oils are widely available. Manufacturers add acids or other chemicals to eliminate the risk of botulism in their products. Two outbreaks of botulism related to garlic stored in oil have been reported.

Garlic bulbs should be clean and white with a dried neck and outer skin and quite firm under pressure. They should be discarded if they are soft or spongy or show signs of mold.

3.2.17 Ginger

Fig 3.22: *Parts of plant of Ginger*

Ginger produces a hot, fragrant kitchen spice. Young ginger rhizomes are juicy and fleshy with a very mild taste. They are often pickled in vinegar or sherry as a snack or cooked as an ingredient in many dishes. They can be steeped in boiling water to make ginger tisane, to which honey is often added; sliced orange or lemon fruit may be added. Ginger can be made into candy, or ginger wine, which has been made commercially since 1740.

Mature ginger rhizomes are fibrous and nearly dry. The juice from ginger roots is often used as a seasoning in Indian recipes and is a common ingredient of Chinese, Korean, Japanese, Vietnamese, and many South Asian cuisines for flavoring dishes such as seafood, meat, and vegetarian dishes.

Fresh ginger can be substituted for ground ginger at a ratio of six to one, although the flavors of fresh and dried ginger are somewhat different. Powdered dry ginger root is typically used as a flavoring for recipes such as gingerbread, cookies, crackers and cakes, ginger ale, and ginger beer.

Candied ginger, or crystallized ginger, is the root cooked in sugar until soft, and is a type of confectionery.

Fresh ginger may be peeled before eating. For longer-term storage, the ginger can be placed in a plastic bag and refrigerated or frozen.

Fig 3.23: *Fresh ginger rhizome*

In Indian cuisine, ginger is a key ingredient, especially in thicker gravies, as well as in many other dishes, both vegetarian and meat-based. Ginger also has a role in traditional Ayurvedic medicine. It is an ingredient in traditional Indian drinks, both cold and hot, including spiced masala chai. Fresh ginger is one of the main spices used for making pulse and lentil curries and other vegetable preparations. Fresh ginger together with peeled garlic cloves is crushed or ground to form ginger garlic masala. Fresh, as well as dried, ginger is used to spice tea and coffee, especially in winter. Ginger powder is used in food preparations intended primarily for pregnant or nursing women, the most popular one being katlu, which is a mixture of gum resin, ghee, nuts, and sugar. Ginger is also consumed in candied and pickled form.

In Japan, ginger is pickled to make beni shoga and gari or grated and used raw on tofu or noodles. It is made into a candy called shoga no sato zuke. In the traditional Korean kimchi, ginger is either finely minced or just juiced to avoid the fibrous texture and added to the ingredients of the spicy paste just before the fermenting process.

In Western cuisine, ginger is traditionally used mainly in sweet foods such as ginger ale, gingerbread, ginger snaps, parkin, ginger biscuits, and speculaas. A ginger-flavored liqueur called Canton is produced in Jarnac, France. Ginger wine is a ginger-flavored wine produced in the United Kingdom, traditionally sold in a green glass bottle. Ginger is also used as a spice added to hot coffee and tea.

3.2.18 Nutmeg (Marathi: Jayphal)

Fig 3.24: Nutmeg seeds showing "veins"

***Fig 3.25**: Mace (red) within nutmeg fruit*

Nutmeg and mace have similar sensory qualities, with nutmeg having a slightly sweeter and mace a more delicate flavour. Mace is often preferred in light dishes for the bright orange, saffron-like hue it imparts.

Nutmeg is used for flavouring many dishes, usually in ground or grated form, and is best grated fresh in a nutmeg grater.

In Indian cuisine, nutmeg is used in many sweet, as well as savoury, dishes (predominantly in Mughlai cuisine). In Kerala Malabar region, it is considered medicinal and the flesh made into juice, pickles and chutney, while the grated nutmeg is used in meat preparations and also sparingly added to desserts for the flavour. It is also added in small quantities as a medicine for infants. It may also be used in small quantities in garam masala. Ground nutmeg is also smoked in India.

In traditional European cuisine, nutmeg and mace are used especially in potato dishes and in processed meat products; they are also used in soups, sauces, and baked goods. It is also commonly used in rice pudding. In Dutch cuisine, nutmeg is added to vegetables such as Brussels sprouts, cauliflower, and string beans. Nutmeg is a traditional ingredient in mulled cider, mulled wine, and eggnog. In Scotland, mace and nutmeg are usually both ingredients in haggis.

In Italian cuisine, nutmeg is almost uniquely used as part of the stuffing for many regional meat-filled dumplings like tortellini, as well as for the traditional meatloaf.

Japanese varieties of curry powder include nutmeg as an ingredient.

In the US, nutmeg is known as the main pumpkin pie spice and often shows up in simple recipes for other winter squashes such as baked acorn squash.

Check your Progress:

1. What are the important consideration while storing garlic?
2. How can the powdered dry roots of ginger be used in cooking ?
3. Why are mace preferred to nutmeg?

3.2.19 Onion

Fig 3.26: *Onion*

Culinary uses

Fig 3.27: *Sautéing onions*

Onions are commonly chopped and used as an ingredient in various hearty warm dishes, and may also be used as a main ingredient in their own right, for example in French onion soup or onion chutney. They are very versatile and can be baked, boiled, braised, grilled, fried, roasted, sautéed, or eaten raw in salads.] Their layered nature makes them easy to hollow out once cooked, facilitating stuffing them. Onions are a staple in Indian cuisine, used as a thickening agent for curries and gravies. Onions pickled in vinegar are eaten as a snack. These are traditionally a side serving in pubs and fish and chip shops throughout the United Kingdom and the Commonwealth. Pickled onions form part of a British pub Ploughman's lunch, usually served with cheese and ale. In North America, sliced onions are battered and deep-fried and served as onion rings.

Onion types and products

Common onions are normally available in three color varieties. Yellow or brown onions (called red in some European countries), are full-flavoured and are the onions of choice for everyday use. Yellow onions turn a rich, dark brown when caramelized and give French onion soup its sweet flavour. The red onion (called purple in some European countries) is a good choice for fresh use when its color livens up the dish; it is also used in grilling. White onions are the traditional onions used in classic Mexican cuisine; they have a golden color when cooked and a particularly sweet flavor when sautéed.

While the large, mature onion bulb is most often eaten, onions can be eaten at immature stages. Young plants may be harvested before bulbing occurs and used whole as spring onions or scallions.] When an onion is harvested after bulbing has begun, but the onion is not yet mature, the plants are sometimes referred to as "summer" onions.

Additionally, onions may be bred and grown to mature at smaller sizes. Depending on the mature size and the purpose for which the onion is used, these may be referred to as pearl, boiler, or pickler onions, but differ from true pearl onions which are a different species. Pearl and boiler onions may be cooked as a vegetable rather than as an ingredient and pickler onions are often preserved in vinegar as a long-lasting relish.

Onions are available in fresh, frozen, canned, caramelized, pickled, and chopped forms. The dehydrated product is available as kibbled, sliced, rings, minced, chopped, granulated, and powder forms.

Onion powder is a seasoning widely used when the fresh ingredient is not available. It is made from finely ground, dehydrated onions, mainly the pungent varieties of bulb onions, and has a strong odour. Being dehydrated, it has a long shelf life and is available in several varieties: yellow, red, and white

3.2.20 Oregano

Culinary Uses

Oregano is an important culinary herb, used for the flavour of its leaves, which can be more flavourful when dried than fresh. It has an aromatic, warm, and slightly bitter taste, which can vary in intensity. Good-quality oregano may be strong enough almost to numb the tongue, but cultivars adapted to colder

climates often have a lesser flavor. Factors such as climate, season, and soil composition may affect the aromatic oils present, and this effect may be greater than the differences between the various species of plants. Among the chemical compounds contributing to the flavour are carvacrol, thymol, limonene, pinene, ocimene, and caryophyllene.

Oregano's most prominent modern use is as the staple herb of Italian-American cuisine. Its popularity in the US began when soldiers returning from World War II brought back with them a taste for the “pizza herb”, which had probably been eaten in southern Italy for centuries. There, it is most frequently used with roasted, fried, or grilled vegetables, meat, and fish. Oregano combines well with spicy foods popular in southern Italy. It is less commonly used in the north of the country, as marjoram generally is preferred.

The herb is widely used in cuisines of the Mediterranean Basin, the Philippines, and Latin America.

In Turkish cuisine, oregano is mostly used for flavoring meat, especially for mutton and lamb. In barbecue and kebab restaurants, it can be usually found as a condiment, together with paprika, salt, and pepper.

3.2.21 Parsley

Fig 3.28: *Parsley*

Culinary use

Parsley is widely used in Middle Eastern, European, Brazilian and American cooking. Curly leaf parsley is used often as a garnish. Green parsley is used frequently as a garnish on potato dishes (boiled or mashed potatoes), on rice dishes (risotto or pilaf), on fish, fried chicken, lamb, goose, and steaks, as well in meat or vegetable stews (including shrimp creole, beef bourguignon, goulash, or chicken paprikash).

In central Europe, eastern Europe and southern Europe, as well as in western Asia, many dishes are served with fresh green, chopped parsley sprinkled on top. In southern and central Europe, parsley is part of bouquet garni, a bundle of fresh herbs used as an ingredient in stocks, soups, and sauces. Freshly chopped green parsley is used as a topping for soups such as chicken soup, green salads, or salads such as salade Olivier, and on open sandwiches with cold cuts or pâtés.

Persillade is a mixture of chopped garlic and chopped parsley in French cuisine.

Parsley is the main ingredient in Italian salsa verde, which is a mixed condiment of parsley, capers, anchovies, garlic, and bread soaked in vinegar. It is an Italian custom to serve it with bollito misto or fish. Gremolata, a mixture of parsley, garlic, and lemon zest, is a traditional accompaniment to the Italian veal stew, ossobuco alla milanese.

In England, parsley sauce is a roux-based sauce, commonly served over fish or gammon.

Root parsley is very common in Central, Eastern and Southern European cuisines, where it is used as a snack or a vegetable in many soups, stews, and casseroles, and as ingredient for broth.

3.2.22 Peppermint (Hindi: Pudina)

Fig 3.29: *Peppermint leaves*

Peppermint is the oldest and most popular flavour of mint-flavoured confectionery and is often used in tea and for flavouring ice cream, confectionery, chewing gum, and toothpaste. Peppermint can also be found in some shampoos, soaps and skin care products.

Menthol activates cold-sensitive TRPM8 receptors in the skin and mucosal tissues, and is the primary source of the cooling sensation that follows the topical application of peppermint oil.

Peppermint flowers are large nectar producers and honey bees, as well as other nectar harvesting organisms, forage them heavily. A mild, pleasant varietal honey can be produced if there is a sufficient area of plants

3.2.23 Saffron (Hindi:Kesar)

Culinary use

Fig 3.30: *Saffron rice made with bouillon cubes and saffron*.

Saffron features in European, North African, and Asian cuisines. Its aroma is described by taste experts as resembling that of honey, with woody, hay-like, and earthy notes; according to another such assessment, it tastes of hay, but only with bitter hints. Because it imparts a luminous yellow-orange hue, it is used worldwide in everything from cheeses, confectioneries, and liquors to baked goods, curries, meat dishes, and soups. In past eras, many dishes called for prohibitively copious amounts—hardly for taste, but to parade their wealth.

Because of its high cost saffron was often replaced by or diluted with safflower (Carthamus tinctorius) or turmeric (Curcuma longa) in cuisine. Both mimic saffron's colour well, but have distinctive flavours. Saffron is used in the confectionery and liquor industries; this is its most common use in Italy. Chartreuse, izarra, and strega are types of alcoholic beverages that rely on saffron to provide a flourish of colour and flavour. The savvy often crumble and pre-soak saffron threads for several minutes prior to adding them to their dishes. They may toss threads into water or sherry and leave them to soak for approximately ten minutes. This process extracts the threads' colour and flavour into the liquid phase; powdered saffron does

not require this step. The soaking solution is then added to the hot cooking dish, allowing even colour and flavour distribution, which is critical in preparing baked goods or thick sauces.

Threads are a popular condiment for rice in Spain and Iran, India and Pakistan, and other countries. Two examples of such saffron rice is the zarzuela fish-seafood stew and paella valenciana, a piquant rice-meat preparation. It is essential in making the French bouillabaisse, which is a spicy fish stew from Marseilles, and the Italian risotto alla milanese. The saffron bun has Swedish and Cornish variants and in Swedish is known as lussekatt (literally "Lucy cat", after Saint Lucy) or lussebulle. The latter is a rich yeast dough bun that is enhanced with saffron, along with cinnamon or nutmeg and currants. They are typically eaten during Advent, and especially on Saint Lucy's Day. In England, the saffron "revel buns" were traditionally baked for anniversary feasts (revels) or for church dedications. In the West of Cornwall, large saffron "tea treat buns" signify Methodist Sunday School outings and activities.

Moroccans use saffron in their tajine-prepared dishes, including kefta (meatballs with tomato), mqualli (a citron-chicken dish), and mrouzia (succulent lamb dressed with plums and almonds). Saffron is key in the chermoula herb mixture that flavours many Moroccan dishes. Uzbeks use it in a special rice-based offering known as "wedding plov" (cf. pilaf). Saffron is also essential in chelow kabab, the Iranian national dish. The use of saffron in south Indian cuisine is perhaps best characterised by the eponymous Kesari bhath - a semolina based dessert from Karnataka. South Asian cuisines also use saffron in biryanis, which are spicy rice-vegetable dishes. (An example is the Pakki variety of Hyderabadi biryani.) Saffron spices subcontinental beef and chicken entrees and goes into many sweets, particularly in Muslim and Rajasthani fare. Modern technology has added another delicacy to the list: saffron ice cream. Regional milk-based sweets feature it, among them gulab jamun, kulfi, double ka meetha, and "saffron lassi"; the last is a sweet yogurt-based Jodhpuri drink that is culturally symbolic.

Within India, companies producing ice-cream, Haldiram's, Vadilal and Bikaji, use saffron in large quantities.

3.3 CEREAL AND PULSES

3.3.1 Cereal

A cereal is any grass cultivated for the edible components of its grain (botanically, a type of fruit called a caryopsis), composed of the endosperm, germ, and bran. Cereal grains are grown in greater quantities and provide more food energy worldwide than any other type of crop; they are therefore staple crops. Some plants often referred to as cereals, like buckwheat and quinoa, are considered instead pseudocereals, since they are not grasses, however they are still considered grains.

In their natural form (as in whole grain), they are a rich source of vitamins, minerals, carbohydrates, fats, oils, and protein. When refined by the removal of the bran and germ, the remaining endosperm is mostly carbohydrate. In some developing nations, grain in the form of rice, wheat, millet, or maize constitutes a majority of daily sustenance. In developed nations, cereal consumption is moderate and varied but still substantial.

Fig 3.31: *Various cereals and their products*

The following table shows the annual production of cereals in 1961, 2010, 2011, 2012, and 2013 ranked by 2013 production.

Grain	Worldwide production (millions of metric tons)					Notes
	2013	2012	2011	2010	1961	
Maize(corn)	1016	872	888	851	205	A staple food of people in the Americas, Africa, and of livestock worldwide; often called corn in North America, Australia, and New Zealand. A large portion of maize crops are grown for purposes other than human consumption. It can also be used for indirect human consumption through the production of the Mexican truffle.
Rice	745	720	725	703	285	The primary cereal of tropical and some temperate regions. Staple food in most of Brazil (both maize and manioc/cassava were once more important and its presence is still stronger in some areas),

						other parts of Latin America and some other Portuguese-descended cultures, parts of Africa (even more before the Columbian exchange), most of South Asia and the Far East. Largely overridden by breadfruit (a dicot tree) during the South Pacific's part of the Austronesian expansion.
Wheat	713	671	699	650	222	The primary cereal of temperate regions. It has a worldwide consumption but it is a staple food of North America, Europe, Australia, New Zealand, most of the Southern Cone and much of the Greater Middle East. Wheat gluten-based meat substitutes are important in the Far East (albeit less than tofu) and said to resemble meat texture more than others.
Barley	144	133	133	124	72	Grown for malting and livestock on land too poor or too cold for wheat.
Sorghum	61	57	58	60	41	Important staple food in Asia and Africa and popular worldwide for livestock.
Millet	30	30	27	33	26	A group of similar but distinct cereals that form an important staple food in Asia and Africa.
Oats	23	21	22	20	50	Popular worldwide as a breakfast food and livestock feed. In human consumption, oats can be served as porridge asoatmeal, although oats could be eaten various different forms other than rolled oats, including unprocessed oats. Oats are commonly mixed with bananas in exercise-intensive diets.

Rye	16	15	13	12	12	Important in cold climates.
Triticale	14.5	14	13	14	35	Hybrid of wheat and rye, grown similarly to rye.
Buckwheat	2.5	2.3	2.3	1.4	2.5	A pseudocereal, as it is in the Polygonaceae family, not Poaceae, used in Eurasia and to a minor degree the United States and Brazil. Major uses include various pancakes, groats and noodle production.
Fonio	0.6	0.59	0.59	0.57	0.18	Several varieties are grown as food crops in Africa.
Quinoa	0.10	0.08	0.08	0.08	0.03	Pseudocereal, traditional to the Andes, but increasingly popular elsewhere.

Maize, wheat, and rice together accounted for 89% of all cereal production worldwide in 2012, and 43% of all food calories in 2009, while the production of oats and triticale have drastically fallen from their 1960s levels. Other grains that are important in some places, but that have little production globally (and are not included in FAO statistics), include:

- Teft, an ancient grain that is a staple in Ethiopia. It is high in fiber and protein. Its flour is often used to make injera. It can also be eaten as a warm breakfast cereal similar tofarina with a chocolate or nutty flavor. Its flour and whole grain products can usually be found in natural foods stores.
- Wild rice, grown in small amounts in North America.
- Amaranth, an ancient pseudocereal, formerly a staple crop of the Aztec Empire and now widely grown in Africa.
- Kañiwa, close relative of quinoa.

Several other species of wheat have also been domesticated, some very early in the history of agriculture:

- Spelt, a close relative of common wheat.
- Einkorn, a wheat species with a single grain.
- Emmer, one of the first crops domesticated in the Fertile Crescent.
- Durum, the only tetraploid species of wheat currently cultivated, used to make semolina.

- Kamut, an ancient relative of durum with an unknown history.

In 2013 global cereal production reached a record 2,521 million tonnes. A slight dip to 2,498 million tonnes was forecast for 2014 by the FAO in July 2014.

CHECK YOUR PROGRESS

1. Which are the four most popular cereals in the world?
2. What is mean by pseudocereal? Give two examples of pseudocereals?
3. What is the importance of cereals in the food?

3.3.2 Legume (Pulses)

A legume (/ˈlɛgjuːm/ or /ˌləˈgjuːm/) is a plant in the family Fabaceae (or Leguminosae), or the fruit or seed of such a plant. Legumes are grown agriculturally, primarily for their grain seed called pulse, for livestock forage and silage, and as soil-enhancing green manure. Well-known legumes include alfalfa, clover, peas, beans, lentils, lupins, mesquite, carob, soybeans, peanuts, and tamarind.

A legume fruit is a simple dry fruit that develops from a simple carpel and usually dehisces (opens along a seam) on two sides. A common name for this type of fruit is a pod, although the term "pod" is also applied to a few other fruit types, such as that of vanilla (a capsule) and of radish (a silique).

Legumes are notable in that most of them have symbiotic nitrogen-fixing bacteria in structures called root nodules. For that reason, they play a key role in crop rotation.

***Fig 3.32**: Various pulses*

Human consumption

***Fig 3.33**: Freshly dug peanuts*

Grain legumes are cultivated for their seeds. The seeds are used for human and animal consumption or for the production of oils for industrial uses. Grain legumes include beans, lentils, lupins, peas, and peanuts.

Nutritional value

Legumes are a significant source of protein, dietary fiber, carbohydrates and dietary minerals; for example, a 100 gram serving of cooked chickpeas contains 18% of the Daily Value (DV) for protein, 30% DV for dietary fiber, 43% DV for folate and 52% DV for manganese. Like other plant-based foods, pulses contain no cholesterol and little fat or sodium.

Legumes are also an excellent source of resistant starch which is broken down by bacteria in the large intestine to produce short-chain fatty acids used by intestinal cells for food energy.

Preliminary studies in humans include the potential for regular consumption of legumes in a vegetarian diet to affect metabolic syndrome. There is evidence that a portion of pulses (roughly one cup daily) in a diet may help lower blood pressure and reduce LDL cholesterol levels, though there is a concern about the quality of the supporting data.

Classification

***Fig 3.34**:Depending on the variety,Phaseolus vulgaris (a **pulse**) may be called "common bean", "kidney bean", "haricot bean", "pinto bean", "navy bean", among other names.*

Food and Agriculture Organisation (FAO) of UN recognizes 11 primary pulses.

1. Dry beans (*Phaseolus spp.* including several species now in *Vigna*)
    - Kidney bean, navy bean, pinto bean, haricot bean (*Phaseolus vulgaris*)

- Lima bean, butter bean (*Phaseolus lunatus*)
- Adzuki bean, azuki bean (*Vigna angularis*)
- Mung bean, golden gram, green gram (*Vigna radiata*)
- Black gram, urad (*Vigna mungo*)
- Scarlet runner bean (*Phaseolus coccineus*)
- Ricebean (*Vigna umbellata*)
- Moth bean (*Vigna aconitifolia*)
- Tepary bean (*Phaseolus acutifolius*)

2. Dry broad beans (*Vicia faba*)
    - Horse bean (*Vicia faba equina*)
    - Broad bean (*Vicia faba*)
    - Field bean (*Vicia faba*)
3. Dry peas (*Pisum spp.*)
    - Garden pea (*Pisum sativum* var. *sativum*)
    - Protein pea (*Pisum sativum* var. *arvense*)
4. Chickpea, garbanzo, Bengal gram (*Cicer arietinum*)
5. Dry cowpea, black-eyed pea, blackeye bean (*Vigna unguiculata*)
6. Pigeon pea, Arhar/Toor, cajan pea, Congo bean, gandules (*Cajanus cajan*)
7. Lentil (*Lens culinaris*)
8. Bambara groundnut, earth pea (*Vigna subterranea*)
9. Vetch, common vetch (*Vicia sativa*)
10. Lupins (*Lupinus spp.*)
11. Minor pulses, including:
    - Lablab, hyacinth bean (*Lablab purpureus*)
    - Jack bean (*Canavalia ensiformis*), sword bean (*Canavalia gladiata*)
    - Winged bean (*Psophocarpus tetragonolobus*)
    - Velvet bean, cowitch (*Mucuna pruriens var. utilis*)
    - Yam bean (*Pachyrhizus erosus*)

International Year of Pulses

Fig 3.35:*Logo of International Year of Pulses 2016*

The International Year of Pulses 2016 (IYP 2016) was declared by the Sixty-eighth session of the United Nations General Assembly.The Food and Agriculture Organization of the United Nations has been nominated to facilitate the implementation of IYP 2016 in collaboration with governments, relevant organizations, non-governmental organizations and other relevant stakeholders. Its aim is to heighten public awareness of the nutritional benefits of pulses as part of sustainable food production aimed towards food security andnutrition. IYP 2016 will create an opportunity to encourage connections throughout the food chain that would better utilize pulse-based proteins, further global production of pulses, better utilize crop rotations and address challenges in the global trade of pulses.

CHECK YOUR PROGRESS

1. What is the importance of pulses in the food?
2. How do most of the legumes help in nitrogen fixation?
3. Why has the UN chosen 2016 as International year of Pulses?

3.4 FRUITS AND VEGETABLES

3.4.1 Fruit

***Fig 3.36**: Culinary fruits*

In botany, a **fruit** is the seed-bearing structure in flowering plants (also known as angiosperms) formed from the ovary after flowering.

Fruits are the means by which angiosperms disseminate seeds. Edible fruits, in particular, have propagated with the movements of humans and animals in a symbiotic relationship as a means for seed dispersal and nutrition; in fact, humans and many animals have become dependent on fruits as a source of food. Accordingly, fruits account for a substantial fraction of the world's agricultural output, and some (such as the apple and the pomegranate) have acquired extensive cultural and symbolic meanings.

In common language usage, "fruit" normally means the fleshy seed-associated structures of a plant that are sweet or sour, and edible in the raw state, such as apples, bananas, grapes, lemons, oranges, and strawberries. On the other hand, in botanical usage, "fruit" includes many structures that are not commonly called "fruits", such as bean pods, corn kernels, tomatoes, and wheat grains. The section of afungus that produces spores is also called a fruiting body.

Fig 3.37: *Avacado fuit*

Culinary uses

Fig 3.38: Avocado salad, and a tomato and black olive salsa, on a toasted baguette

The fruit of horticultural cultivars has a markedly higher fat content than most other fruit, mostly monounsaturated fat, and as such serves as an important staple in the diet of consumers who have limited access to other fatty foods (high-fat meats and fish, dairy products). Having a high smoke point, avocado oil is expensive compared to common salad and cooking oils, and mostly used for salads or dips.

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Fig 3.39: Indonesian-style avocado milkshake with chocolate syrup

The fruit is not sweet, but distinctly and subtly flavored, with smooth texture. It is used in both savory and sweet dishes, though in many countries not for both. The avocado is popular in vegetarian cuisine as a substitute for meats in sandwiches and salads because of its high fat content.

Generally, avocado is served raw, though some cultivars, including the common 'Hass', can be cooked for a short time without becoming bitter. Caution should be used when cooking with untested cultivars; the flesh of some avocados may be rendered inedible by heat. Prolonged cooking induces this chemical reaction in all cultivars.

Avocado slices are frequently added to hamburgers, *tortas*, hot dogs, and *carne asada*. Avocado can be combined with eggs (in scrambled eggs, tortillas, or omelettes), and is a key ingredient in California rolls and other *makizushi* ("maki", or rolled sushi).

In the United Kingdom, the avocado became available during the 1960s when introduced by Sainsbury's under the name 'avocado pear'.

Nutrients and fat composition

A typical serving of avocado (100 g) is moderate to rich in several B vitamins and vitamin K, with good content of vitamin C, vitamin E and potassium. Avocados also contain phytosterols and carotenoids, such as lutein and zeaxanthin.[7]

Avocados have diverse fats. For a typical avocado:

- About 75% of an avocado's energy comes from fat, most of which (67% of total fat) is monounsaturated fat as oleic acid.
- Other predominant fats include palmitic acid and linoleic acid.
- The saturated fat content amounts to 14% of the total fat.
- Typical total fat composition is roughly: 1% ω-3, 14% ω-6, 71% ω-9 (65% oleic and 6% palmitoleic), and 14% saturated fat(palmitic acid).

Although costly to produce, nutrient-rich avocado oil has diverse uses for salads or cooking and in cosmetics and soap products.

Diet and preliminary research

A 2013 epidemiological NHANES study funded by the Hass Avocado Board showed that American avocado consumers had better overall diet quality, nutrient levels, and reduced risk of metabolic syndrome; why they had better diet quality and how the confluence of these factors contributed to health benefits was not determined.

High avocado intake was shown in one preliminary study to lower blood cholesterol levels. Specifically, after a seven-day diet rich in avocados, mild hypercholesterolemia patients showed a 17% decrease in total serum cholesterol levels. These subjects showed a 22% decrease in LDL (harmful cholesterol) and triglyceride levels and 11% increase in HDL (helpful cholesterol) levels. In a study of obese patients on a moderate fat diet (34% of calories), additional consumption of one avocado (136 g) per day over 5 weeks produced a significant reduction of circulating LDL, an effect the authors attributed to the avocado's combination of monounsaturated fats, dietary fiber and the phytosterol, beta-sitosterol.

Apple

Fig 3.40: *Apple fruit*

The apple tree is a deciduous tree in the rose family best known for its sweet, pomaceous fruit, the apple. It is cultivated worldwide as a fruit tree, and is the most widely grown species in the genus Malus. The tree originated in Central Asia, where its wild ancestor, Malus sieversii, is still found today. Apples have been grown for thousands of years in Asia and Europe, and were brought to North America by European colonists.

Apple trees are large if grown from seed, but small if grafted onto roots (rootstock). There are more than 7,500 known cultivars of apples, resulting in a range of desired characteristics. Different cultivars are bred for various tastes and uses, including cooking, eating raw and cider production. Apples are generally propagated by grafting, although wild apples grow readily from seed. Trees and fruit are prone to a number of fungal, bacterial and pest problems, which can be controlled by a number of organic and non-organic means. In 2010, the fruit's genome was sequenced as part of research on disease control and selective breeding in apple production.

Worldwide production of apples in 2013 was 80.8 million tonnes, with China accounting for 49% of the total.

Apricot

Fig 3.41*: Apricot*

An **apricot** is a fruit or the tree that bears the fruit of several species in the genus *Prunus* (stone fruits). Usually, an apricot tree is from the species *P. armeniaca*, but the species *P. brigantina*, *P. mandshurica*, *P. mume*, and *P. sibirica* are closely related, have similar fruit, and are also called apricots

Banana

Fig 3.42: *Banana*

The banana is an edible fruit, botanically a berry, produced by several kinds of large herbaceous flowering plants in the genus Musa. In some countries, bananas used for cooking may be called plantains. The fruit is variable in size, color and firmness, but is usually elongated and curved, with soft flesh rich in starch covered with a rind which may be green, yellow, red, purple, or brown when ripe. The fruits grow in clusters hanging from the top of the plant. Almost all modern edible seedless bananas come from two wild species – Musa acuminata and Musa balbisiana. They are grown in at least 107 countries, primarily for their fruit, and to a lesser extent to make fiber, banana wine and banana beer and as ornamental plants.

Worldwide, there is no sharp distinction between "bananas" and "plantains". Especially in the Americas and Europe, "banana" usually refers to soft, sweet, dessert bananas, particularly those of the Cavendish group, which are the main exports from banana-growing countries. By contrast, Musa cultivars with firmer, starchier fruit are called "plantains". In other regions, such as Southeast Asia, many more kinds of banana are grown and eaten, so the simple two-fold distinction is not useful and is not made in local languages.

The term "banana" is also used as the common name for the plants which produce the fruit. This can extend to other members of the genus Musa like the scarlet banana (Musa coccinea), pink banana (Musa velutina) and the Fe'i bananas. It can also refer to members of the genus Ensete, like the snow banana (Ensete glaucum) and the economically important false banana (Ensete ventricosum). Both genera are classified under the banana family, Musaceae.

Check your Progress:

1. What are the important nutritional values of Avacado?
2. Which is the largest producer of apple?
3. What is the main difference between banana and plaintain?

Bael (Aegle marmelos)

Aegle marmelos, commonly known as bael (or bili or bhel), also Bengal quince,] golden apple, Japanese bitter orange, stone apple, or wood apple, is a species of tree native to Bangladesh and India. It is present throughout Southeast Asia as a naturalized species. The tree is considered to be sacred by Hindus. Its fruits are used in traditional medicine and as a food throughout its range.

Supari (Areca nut)

The areca nut (/ˈærɪkə/ or /əˈriːkə/) is the seed of the areca palm (Areca catechu), which grows in much of the tropical Pacific, Asia, and parts of east Africa. This seed is commonly referred to as betel nut so it is easily confused with betel leaves that are often used to wrap it (paan). The term areca originated from a South Asian word during the 16th century, when Dutch and Portuguese sailors took the nut to Europe. Consumption has many harmful effects on health and is carcinogenic to humans. Various compounds present in the nut, most importantly arecoline (the primary psychoactive ingredient), contribute to histologic changes in the oral mucosa. As with chewing tobacco, its use is discouraged by preventive efforts, such as awareness of the risks of chewing buai.

Fig 3.43: *Karela wine, fruit and seed*

Momordica charantia, known as bitter melon, bitter gourd, bitter squash, or balsam-pear, has names in other languages which have entered English as loanwords, e.g. goya from Okinawan and karela from Sanskrit.

It is a tropical and subtropical vine of the family Cucurbitaceae, widely grown in Asia, Africa, and the Caribbean for its edible fruit. Its many varieties differ substantially in the shape and bitterness of the fruit.

Bitter melon originated in India and was introduced into China in the 14th century,

Fig 3.44: Ripe fruit

Culinary Use

Bitter melon is generally consumed cooked in the green or early yellowing stage. The young shoots and leaves of the bitter melon may also be eaten as greens.

In Chinese cuisine, bitter melon (Chinese: 苦瓜, pinyin: kǔguā or kugua) is valued for its bitter flavor, typically in stir-fries (often with pork and douchi), soups, dim sum, and herbal teas (See Gohyah tea). It has also been used in place of hops as the bittering ingredient in some beers in China and Okinawa.

Bitter melon is very popular throughout India. In North Indian cuisine, it is often served with yogurt on the side to offset the bitterness, used in curry such as sabzi or stuffed with spices and then cooked in oil.

In South Indian cuisine, it is used in the dishes thoran/thuvaran (mixed with grated coconut), mezhukkupuratti (stir fried with spices), theeyal (cooked with roasted coconut) and pachadi (which is considered a medicinal food for diabetics). Other popular recipes include preparations with curry, deep

fried with peanuts or other ground nuts, and Pachi Pulusu, a soup with fried onions and other spices. In Tamil Nadu, where it is known as paagarkaai or pavakai (பாகற்காய்) in Tamil, a special preparation called pagarkai pitla, a kind of sour koottu, variety is very popular. Also popular is kattu pagarkkai, a curry that involves stuffing with onions, cooked lentil and grated coconut mix, tied with thread and fried in oil. In the Konkan region of Maharashtra, salt is added to finely chopped bitter gourd, known as karle (कारले) in Marathi, and then it is squeezed, removing its bitter juice to some extent. After frying this with different spices, the less bitter and crispy preparation is served with grated coconut. In Kannada it is known as haagalakaayi.

In northern India and Nepal, bitter melon, known as tite karela (तीते करेला) in Nepali, is prepared as a fresh pickle. For this, the vegetable is cut into cubes or slices, and sautéed with oil and a sprinkle of water. When it is softened and reduced, it is crushed in a mortar with a few cloves of garlic, salt and a red or green pepper. It is also eaten sautéed to golden-brown, stuffed, or as a curry on its own or with potatoes.

In Pakistan, known as karela (کریلا) in Urdu-speaking areas, and Bangladesh, known as korola (করলা|করলা) in Bengali, bitter melon is often cooked with onions, red chili powder, turmeric powder, salt, coriander powder, and a pinch of cumin seeds. Another dish in Pakistan calls for whole, unpeeled bitter melon to be boiled and then stuffed with cooked minced beef, served with either hot tandoori bread, naan, chappati, or with khichri (a mixture of lentils and rice).

Check your Progress:

1. What is the native habitat of Bael?
2. Why do people confuse areca with betel nut ?
3. Why is supari harmful?

Papaya

Fig 3.45: *Papaya fruit cut to show seeds (left) and exterior of Papaya fruit (right)*

Culinary uses

The ripe fruit of the papaya is usually eaten raw, without skin or seeds. The unripe green fruit can be eaten cooked, usually in curries, salads, and stews. Green papaya is used in Southeast Asian cooking, both

raw and cooked. In Thai cuisine, papaya is used to make Thai salads such as som tam and Thai curries such as kaeng som when still not fully ripe. In Indonesian cuisine, the unripe green fruits and young leaves are boiled for use as part of lalab salad, while the flower buds are sautéed and stir-fried with chillies and green tomatoes as Minahasan papaya flower vegetable dish. Papayas have a relatively high amount of pectin, which can be used to make jellies. The smell of ripe, fresh papaya flesh can strike some people as unpleasant. In Brazil, the unripe fruits are often used to make sweets or preserves.

The black seeds of the papaya are edible and have a sharp, spicy taste. They are sometimes ground and used as a substitute for black pepper.

In some parts of Asia, the young leaves of the papaya are steamed and eaten like spinach.

Meat tenderizing

Both green papaya fruit and the tree's latex are rich in papain, a protease used for tenderizing meat and other proteins, as practiced currently by indigenous Americans and people of the Caribbean region. It is now included as a component in some powdered meat tenderizers.

Jackfruit

Culinary uses

The flesh of the jackfruit is starchy and fibrous and is a source of dietary fiber. The flavor is comparable to a combination of apple, pineapple, mango, and banana. Varieties are distinguished according to characteristics of the fruit's flesh.

South Asia

In Bangladesh, the fruit is consumed on its own. The unripe fruit is used in curry, and the seed is often dried and preserved to be later used in curry.

In Kerala, India, two varieties of jackfruit predominate: varikka (വരിക്ക) and koozha (കൂഴ). Varikka has a slightly hard inner flesh when ripe, while the inner flesh of the ripe koozha fruit is very soft and almost dissolves. A sweet preparation called chakka varattiyathu (jackfruit jam) is made by seasoning pieces of varikka fruit flesh in jaggery, which can be preserved and used for many months. Huge jackfruits up to four feet in length with a corresponding girth are sometimes seen in Kerala. The young fruit is idichakka or idianchakka in Kerala.

In West Bengal, India, the two varieties are called khaja kathal and moja kathal. The fruits are either eaten alone or as a side to rice, roti, chira, or muri. Sometimes the juice is extracted and either drunk straight or as a side with muri. The extract is sometimes condensed and eaten as candies. The seeds are either boiled or roasted and eaten with salt and hot chilies. They are also used to make spicy side dishes with rice or roti.

In Mangalore, Karnataka, India, the varieties are called bakke and imba. The pulp of the imba jackfruit is ground and made into a paste, then spread over a mat and allowed to dry in the sun to create a natural chewy candy.

In Coorg, Karnataka, India, many culinary items are made with Jackfruit. It is known as Chakke. Jackfruit seeds are fried and a curry is made.

In Maharashtra, and Goa, India, jackfruit is called as Fanas and Panas respectively. It's mostly found in Konkan region. There are two varieties. The hard variety is called kaapa and the soft variety is called barka,barkai or rasal. The juice of the barka is extracted and spread on greased metal dishes, which are then kept for sun-drying. Within 2–3 days, a tasty dried pancake-like dried jackfruit juice called phansacha saath or phanas poli results.

Jackfruit is known as Rukh-Katahar (= tree katahar) in Nepal, while Bhui-Katahar (= Ground Katahar) denotes pineapple. The ripe fruit is eaten by itself (sometimes with a pinch of salt sprinkled on) as a delicacy, while the unripe fruit is used to prepare savory curry. The ripe fruit is also used to brew alcoholic beverages in some parts of the country.

Jamun/Jambul (Syzygium cumini)

Syzygium cumini, known as **jambul**, **jambolan**, **jamblang** or **jamun**, is an evergreen tropical tree in the flowering plant family Myrtaceae.*Syzygium cumini* is native to the Indian Subcontinent and adjoining regions of Southeast Asia. The species ranges across India,Bangladesh, Pakistan, Nepal, Sri Lanka, Malaysia, the Philippines, and Indonesia. The name of the fruit is sometimes mistranslated as blackberry, which is a different fruit in an unrelated family. *Syzygium cumini* has been spread overseas from India by Indian emigrants and at present is common in former tropical British colonies.

Fig 3.46: *Jambool or Jamun berries*

The tree was introduced to Florida, United States in 1911 by the USDA (United States Department of Agriculture), and is also now commonly grown in Suriname, Guyana and Trinidad and Tobago. In Brazil, where it was introduced from India during Portuguese colonization, it has dispersed spontaneously in the wild in some places, as its fruits are eagerly sought by various native birds such as thrushes, tanagers and the great kiskadee. This species is considered an invasive in Hawaii, United States. It is also illegal to grow, plant or transplant in Sanibel, Florida.

Mango

Fig 3.47: *Mangoes*

The mango is a juicy stone fruit (drupe) belonging to the genus Mangifera, consisting of numerous tropical fruiting trees, cultivated mostly for edible fruit. The majority of these species are found in nature as wild mangoes. They all belong to the flowering plant family Anacardiaceae. The mango is native to South Asia, from where it has been distributed worldwide to become one of the most cultivated fruits in the tropics.

While other Mangifera species (e.g. horse mango, Mangifera foetida) are also grown on a more localized basis, Mangifera indica—the "common mango" or "Indian mango"—is the only mango tree commonly cultivated in many tropical and subtropical regions.

It is the national fruit of India, Pakistan, and the Philippines, and the national tree of Bangladesh.

Passion Fruit (Passiflora edulis)

Fig 3.48: *Passion Fruit Flower*

Fig 3.49: *Passion Fruit*

Uses

Passion fruit has a variety of uses related to its appealing taste as a whole fruit and juice.

In Australia and New Zealand, it is available commercially both fresh and tinned. It is added to fruit salads, and fresh fruit pulp or passion fruit sauce is commonly used in desserts, including as a topping for pavlova (a regional meringue cake) and ice cream, a flavouring for cheesecake, and in the icing of vanilla slices. A passionfruit-flavored soft drink called Passiona has also been manufactured in Australia since the 1920s. It can be used in some alcoholic cocktails.

In Colombia, it is one of the most important fruits, especially for juices and desserts. It is widely available all over the country and three kinds of "maracuyá" fruit may be found.

In East Africa, passion fruit is used to make fruit juice and is commonly eaten as a whole fruit.

In Hawaii, where it is known as liliko'i, passion fruit can be cut in half and the seeds scooped out with a spoon. Lilikoi-flavoured syrup is a popular topping for shave ice. It is used as a dessert flavouring for malasadas, cheesecakes, cookies, ice cream and mochi. Passion fruit is also favoured as a jam or jelly, as well as a butter. Lilikoi syrup can also be used to glaze or to marinate meat and vegetables.

In India, the government of Andhra Pradesh started growing passion fruit vines in the Chintapalli (Vizag) forests to make fruit available within the region.

In Indonesia, there are two types of passion fruit (local name: markisa), white flesh and yellow flesh. The white one is normally eaten straight as a fruit, while the yellow variety is commonly strained to obtain its juice, which is cooked with sugar to make thick syrup.

In South Africa, passion fruit, known locally as Granadilla (the yellow variety as Guavadilla), is used to flavour yogurt. It is also used to flavour soft drinks such as Schweppes' "Sparkling Granadilla" and numerous cordial drinks. It is often eaten raw or used as a topping for cakes and tarts. Granadilla juice is commonly available in restaurants. The yellow variety is used for juice processing, while the purple variety is sold in fresh-fruit markets.

In Sri Lanka, passion fruit juice, along with faluda, is one of the most popular refreshments. Passion fruit cordial is manufactured both at home as well as industrially by mixing the pulp with sugar. There are many cordial manufacturers, suppliers and exporters in the country.

Cashew

Fig 3.50: *The cashew tree (Anacardium occidentale) is a tropical evergreen tree that produces the cashew seed and the cashew apple.*

It can grow as high as 14 m (46 ft), but the dwarf cashew, growing up to 6 metres (20 ft), has proved more profitable, with earlier maturity and higher yields.

The cashew seed, often simply called a cashew, is widely consumed. It is eaten on its own, used in recipes, or processed into cashew cheese or cashew butter. The cashew apple is a light reddish to yellow fruit, whose pulp can be processed into a sweet, astringent fruit drink or distilled into liquor.

The shell of the cashew seed yields derivatives that can be used in many applications from lubricants to paints.

The species is originally native to northeastern Brazil. Today, major production of cashews occurs in Vietnam, Nigeria, India and Ivory Coast.

***Fig 3.51**: Cashew nut as snack*

Culinary uses for cashew seeds in snacking and cooking are similar to those for all tree seeds called nuts.

Cashew nuts are commonly used in Indian cuisine, whole for garnishing sweets or curries, or ground into a paste that forms a base of sauces for curries (e.g., korma), or some sweets (e.g., kaju barfi). It is also used in powdered form in the preparation of several Indian sweets and desserts. In Goan cuisine, both roasted and raw kernels are used whole for making curries and sweets. Cashew nuts are also used in Thai and Chinese cuisine, generally in whole form. In the Philippines, cashew is a known product of Antipolo, and is eaten with suman. Pampanga also has a sweet dessert called turrones de casuy, which is cashew marzipan wrapped in white wafers. In Indonesia, roasted and salted cashew nut is called kacang mete or kacang mede, while the cashew apple is called jambu monyet (translates in English to monkey rose apple).

In the 21st Century, cashew cultivation increased in several African countries to meet the demands for manufacturing cashew milk, a plant milk alternative to dairy milk.

The shell of the cashew nut contains oil compounds which may cause contact dermatitis similar in severity to that of poison ivy, primarily resulting from the phenolic lipids, anacardic acid and cardanol. Due to the possible dermatitis, cashews are typically not sold in the shell to consumers. Readily and inexpensively extracted from the waste shells, cardanol is under research for its potential applications in nanomaterials and biotechnology.

Cucumber

Fig 3.52: *Cucumber*

Cucumber (Cucumis sativus) is a widely cultivated plant in the gourd family, Cucurbitaceae. It is a creeping vine that bears cylindrical fruits that are used as culinary vegetables. There are three main varieties of cucumber: slicing, pickling, and burpless. Within these varieties, several different cultivars have emerged. The cucumber is originally from South Asia, but now grows on most continents. Many different varieties are traded on the global market. In North America, the term "wild cucumber" can refer to plants in the genera Echinocystis and Marah, but these are not closely related.

In May 2008, British supermarket chain Sainsbury's unveiled the 'c-thru-cumber', a thin-skinned variety that reportedly does not require peeling.

Armenian cucumbers (also known as yard long cucumbers) are fruits produced by the plant Cucumis melo var. flexuosus. This is not the same species as the common cucumber (Cucumis sativus) although it is closely related. Armenian cucumbers have very long, ribbed fruit with a thin skin that does not require peeling, but are actually an immature melon. This is the variety sold in Middle Eastern markets as "pickled wild cucumber".

Aroma and taste

Most people report a mild, almost watery or light melon aroma and flavor of cucumbers resulting from compounds called (E,Z)-nona-2,6-dienal, (Z)-2-nonenal and (E)-2-nonenal. The slightly bitter taste of cucumbers results from cucurbitacins.

Coconut

Fig 3.53: *Coconut Flower*

The coconut tree (Cocos nucifera) is a member of the family Arecaceae (palm family) and the only accepted species in the genus Cocos. The term coconut can refer to the entire coconut palm, the seed, or the fruit, which, botanically, is a drupe, not a nut. The spelling cocoanut is an archaic form of the word. The term is derived from the 16th-century Portuguese and Spanish word coco meaning "head" or "skull", from the three indentations on the coconut shell that resemble facial features.

Coconuts are known for their great versatility, as evidenced by many traditional uses, ranging from food to cosmetics. They form a regular part of the diets of many people in the tropics and subtropics. Coconuts are distinct from other fruits for their large quantity of "water", and when immature, they are known as tender-nuts or jelly-nuts and may be harvested for their potable coconut water. When mature, they still contain some water and can be used as seednuts or processed to give oil from the kernel, charcoal from the hard shell, and coir from the fibrous husk. The endosperm is initially in its nuclear phase suspended within the coconut water. As development continues, cellular layers of endosperm deposit along the walls of the coconut, becoming the edible coconut "flesh". When dried, the coconut flesh is called copra. The oil and milk derived from it are commonly used in cooking and frying, as well as in soaps and cosmetics. The husks and leaves can be used as material to make a variety of products for furnishing and decorating. The coconut also has cultural and religious significance in certain societies, particularly in India, where it is used in Hindu rituals.

Uses

Coconut trees are used for landscaping along a coastal road in Kota Kinabalu, Sabah, Malaysia.

The coconut palm is grown throughout the tropics for decoration, as well as for its many culinary and nonculinary uses; virtually every part of the coconut palm can be used by humans in some manner and has significant economic value. Coconuts' versatility is sometimes noted in its naming. In Sanskrit, it is kalpa vriksha ("the tree which provides all the necessities of life"). In the Malay language, it is pokok seribu guna ("the tree of a thousand uses"). In the Philippines, the coconut is commonly called the "tree of life".

Cooking

The various parts of the coconut have a number of culinary uses. The seed provides oil for frying, cooking, and making margarine. The white, fleshy part of the seed, the coconut meat, is used fresh or dried in cooking, especially in confections and desserts such as macaroons. Desiccated coconut or coconut milk made from it is frequently added to curries and other savory dishes. Coconut flour has also been developed for use in baking, to combat malnutrition. Coconut chips have been sold in the tourist regions of Hawaii and the Caribbean. Coconut butter is often used to describe solidified coconut oil, but has also been adopted as a name by certain specialty products made of coconut milk solids or puréed coconut meat and oil. Dried coconut is also used as the filling for many chocolate bars. Some dried coconut is purely coconut, but others are manufactured with other ingredients, such as sugar, propylene glycol, salt, and sodium metabisulfite. Some countries in Southeast Asia use special coconut mutant called Kopyor (in Indonesian) or macapuno (in Philippines) as dessert drinks.

Nutritional Value

Coconut meat, raw

Nutritional value per 100 g (3.5 oz)

Energy 354 kcal (1,480 kJ), Carbohydrates, 15.23 g,Sugars:6.23 g, Dietary fiber:9.0 g,

Fat: 33.49 g,(Saturated:29.698 g, Monounsaturated: 1.425 g, Polyunsaturated: 0.366 g,)

Protein: 3.33 g,

(Tryptophan: 0.039 g, Threonine: 0.121 g, Isoleucine: 0.131 g, Leucine 0.247 g, Lysine: 0.147 g, Methionine: 0.062 g, Cystine 0.066 g, Phenylalanine 0.169 g, Tyrosine: 0.103 g, Valine: 0.202 g, Arginine: 0.546 g, Histidine: 0.077 g, Alanine 0.170 g, Aspartic acid 0.325 g, Glutamic acid 0.761 g, Glycine 0.158 g, Proline 0.138 g, Serine 0.172 g,)

Vitamins

(Thiamine (B1) (6%) 0.066 mg, Riboflavin (B2) (2%) 0.020 mg, Niacin (B3) (4%) 0.540 mg, Pantothenic acid (B5) (6%) 0.300 mg, Vitamin B6 (4%) 0.054 mg, Folate (B9) (7%) 26 µg

Vitamin C (4%) 3.3 mg, Vitamin E (2%) 0.24 mg, Vitamin K (0%) 0.2 µg,

Minerals

(Calcium: (1%) 14 mg, Iron: (19%) 2.43 mg, Magnesium: (9%) 32 mg, Manganese (71%) 1.500 mg, Phosphorus: (16%) 113 mg, Potassium: (8%) 356 mg, Sodium: (1%) 20 mg, Zinc: (12%) 1.10 mg,

Other constituents

Water 46.99 g [Units: µg = micrograms • mg = milligrams, IU = International units, Percentages are roughly approximated using US recommendations for adults. Source: USDA Nutrient Database

Nutrition

Per 100-gram serving with 354 calories, raw coconut meat supplies a high amount of total fat (33 grams), especially saturated fat (89% of total fat) and carbohydrates (24 g) (table). Micronutrients in significant content include the dietary minerals manganese, iron, phosphorus, and zinc.

3.5 SALT

Salt

Common salt is a mineral composed primarily of sodium chloride (NaCl), a chemical compound belonging to the larger class of salts; salt in its natural form as a crystalline mineral is known as rock salt or halite. Salt is present in vast quantities in seawater, where it is the main mineral constituent. The open ocean has about 35 grams (1.2 oz) of solids per litre, a salinity of 3.5%.

Salt is essential for human life, and saltiness is one of the basic human tastes. The tissues of animals contain larger quantities of salt than do plant tissues. Salt is one of the oldest and most ubiquitous food seasonings, and salting is an important method of food preservation.

Some of the earliest evidence of salt processing dates to around 8,000 years ago, when people living in an area in what is now known as the country of Romania were boiling spring water to extract the salts; a salt-works in China dates to approximately the same period. Salt was prized by the ancient Hebrews, the Greeks, the Romans, the Byzantines, the Hittites and the Egyptians. Salt became an important article of trade and was transported by boat across the Mediterranean Sea, along specially built salt roads, and across the Sahara in camel caravans. The scarcity and universal need for salt has led nations to go to war over salt and use it to raise tax revenues. Salt is also used in religious ceremonies and has other cultural significance.

Salt is processed from salt mines, or by the evaporation of seawater (sea salt) or mineral-rich spring water in shallow pools. Its major industrial products are caustic soda and chlorine, and is used in many industrial processes including the manufacture of polyvinyl chloride, plastics, paper pulp and many other products. Of the annual global production of around two hundred million tonnes of salt, only about 6% is used for human consumption. Other uses include water conditioning processes, deicing highways, and agricultural use. Edible salt is sold in forms such as sea salt and table salt which usually contains an anti-caking agent and may be iodised to prevent iodine deficiency. As well as its use in cooking and at the table, salt is present in many processed foods.

Fig 3.54: *Red rock salt from the Khewra Salt Mine in Pakistan*

Sodium is an essential nutrient for human health via its role as an electrolyte and osmotic solute. Excessive salt consumption can increase the risk of cardiovascular diseases, such as hypertension, in children and adults. Such health effects of salt have long been studied. Accordingly, numerous world health associations and experts in developed countries recommend reducing consumption of popular salty foods. The World Health Organization recommends that adults should consume less than 2,000 mg of sodium, equivalent to 5 grams of salt per day.

Fig 3.55: *Salt is essential to the health of humans and animals, and is one of the five basic taste sensations*.

Salt is used in many cuisines around the world, and is often found in salt shakers on diners' eating tables for their personal use on food. Salt is also an ingredient in many manufactured foodstuffs. Table salt is a refined salt containing about 97 to 99 percent sodium chloride. Usually, anticaking agents such as sodium aluminosilicate or magnesium carbonate are added to make it free-flowing. Iodized salt, containing potassium iodide, is widely available. Some people put a desiccant, such as a few grains of uncooked rice or a saltine cracker, in their salt shakers to absorb extra moisture and help break up salt clumps that may otherwise form.

Fortified table salt

Some table salt sold for consumption contain additives which address a variety of health concerns, especially in the developing world. The identities and amounts of additives vary widely from country to country. Iodine is an important micronutrient for humans, and a deficiency of the element can cause lowered production of thyroxine (hypothyroidism) and enlargement of the thyroid gland (endemic goitre) in adults or cretinism in children. Iodized salt has been used to correct these conditions since 1924 and consists of table salt mixed with a minute amount of potassium iodide, sodium iodide or sodium iodate. A small amount of dextrose may also be added to stabilize the iodine. Iodine deficiency affects about two billion people around the world and is the leading preventable cause of mental retardation. Iodized table salt has significantly reduced disorders of iodine deficiency in countries where it is used.

The amount of iodine and the specific iodine compound added to salt varies from country to country. In the United States, the Food and Drug Administration (FDA) recommends 150 micrograms of iodine per day for both men and women. US iodized salt contains 46–77 ppm (parts per million), whereas in the UK the iodine content of iodized salt is recommended to be 10–22 ppm.

Sodium ferrocyanide, also known as yellow prussiate of soda, is sometimes added to salt as an anticaking agent. The additive is considered safe for human consumption. Such anti-caking agents have been added since at least 1911 when magnesium carbonate was first added to salt to make it flow more freely. The safety of sodium ferrocyanide as a food additive was found to be provisionally acceptable by the

Committee on Toxicity in 1988. Other anticaking agents sometimes used include tricalcium phosphate, calcium or magnesium carbonates, fatty acid salts (acid salts), magnesium oxide, silicon dioxide, calcium silicate, sodium aluminosilicate and calcium aluminosilicate. Both the European Union and the United States Food and Drug Administration permitted the use of aluminium in the latter two compounds.

In "doubly fortified salt", both iodide and iron salts are added. The latter alleviates iron deficiency anaemia, which interferes with the mental development of an estimated 40% of infants in the developing world. A typical iron source is ferrous fumarate. Another additive, especially important for pregnant women, is folic acid (vitamin B9), which gives the table salt a yellow color. Folic acid helps prevent neural tube defects and anaemia, which affect young mothers, especially in developing countries.

A lack of fluorine in the diet is the cause of a greatly increased incidence of dental caries. Fluoride salts can be added to table salt with the goal of reducing tooth decay, especially in countries that have not benefited from fluoridated toothpastes and fluoridated water. The practice is more common in some European countries where water fluoridation is not carried out. In France, 35% of the table salt sold contains added sodium fluoride.

Check your Progress:

1. What is the importance of salt in human diet?
2. What is fortified and double fortified salt ?
3. What problems maybe caused due to lack of fluoride in our diet?

Other kinds

Unrefined sea salt contains small amounts of magnesium and calcium halides and sulfates, traces of algal products, salt-resistant bacteria and sediment particles. The calcium and magnesium salts confer a faintly bitter overtone, and they make unrefined sea salt hygroscopic (i.e., it gradually absorbs moisture from air if stored uncovered). Algal products contribute a mildly "fishy" or "sea-air" odour, the latter from organobromine compounds. Sediments, the proportion of which varies with the source, give the salt a dull grey appearance. Since taste and aroma compounds are often detectable by humans in minute concentrations, sea salt may have a more complex flavor than pure sodium chloride when sprinkled on top of food. When salt is added during cooking however, these flavors would likely be overwhelmed by those of the food ingredients. The refined salt industry cites scientific studies saying that raw sea and rock salts do not contain enough iodine salts to prevent iodine deficiency diseases.

Different natural salts have different mineralities depending on their source, giving each one a unique flavour. Fleur de sel, a natural sea salt from the surface of evaporating brine in salt pans, has a unique flavour varying with the region from which it is produced. In traditional Korean cuisine, so-called "bamboo salt" is prepared by roasting salt in a bamboo container plugged with mud at both ends. This

product absorbs minerals from the bamboo and the mud, and has been claimed to increase the anticlastogenic and antimutagenic properties of doenjang (a fermented bean paste).

Kosher salt, though refined, contains no iodine and has a much larger grain size than most refined salts. This can give it different properties when used in cooking, and can be useful for preparing kosher meat. Some kosher salt has been certified to meet kosher requirements by a hechsher, but this is not true for all products labelled as kosher salt.

Pickling salt is ultrafine to speed dissolving to make brine. Gourmet salts may be used for specific tastes.

Salt in food

Salt is present in most foods, but in naturally occurring foodstuffs such as meats, vegetables and fruit, it is present in very small quantities. It is often added to processed foods (such as canned foods and especially salted foods, pickled foods, and snack foods or other convenience foods), where it functions as both a preservative and a flavoring. Dairy salt is used in the preparation of butter and cheese products. Before the advent of electrically powered refrigeration, salting was one of the main methods of food preservation. Thus, herring contains 67 mg sodium per 100 g, while kipper, its preserved form, contains 990 mg. Similarly, pork typically contains 63 mg while bacon contains 1,480 mg, and potatoes contain 7 mg but potato crisps 800 mg per 100 g. The main sources of salt in the diet, apart from direct use of sodium chloride, are bread and cereal products, meat products and milk and dairy products.

In many East Asian cultures, salt is not traditionally used as a condiment. In its place, condiments such as soy sauce, fish sauce and oyster sauce tend to have a high sodium content and fill a similar role to table salt in western cultures. They are most often used for cooking rather than as table condiments.

Sodium consumption and health

Table salt is made up of just under 40% sodium by weight, so a 6 g serving (1 teaspoon) contains about 2,300 mg of sodium. Sodium serves a vital purpose in the human body: via its role as an electrolyte, it helps nerves and muscles to function correctly, and it is one factor involved in the osmotic regulation of water content in body organs (fluid balance). Most of the sodium in the Western diet comes from salt. The habitual salt intake in many Western countries is about 10 g per day, and it is higher than that in many countries in Eastern Europe and Asia. The high level of sodium in many processed foods has a major impact on the total amount consumed. In the United States, 75% of the sodium eaten comes from processed and restaurant foods, 11% from cooking and table use and the rest from what is found naturally in foodstuffs.

Because consuming too much salt increases risk of cardiovascular diseases, health organizations generally recommend that people reduce their dietary intake of salt. High salt intake is associated with a greater risk of stroke, total cardiovascular disease and kidney disease. A reduction in sodium intake by 1,000 mg per day may reduce cardiovascular disease by about 30 percent. In adults and children with no acute illness, a decrease in the intake of sodium from the typical high levels reduces blood pressure. A low salt diet results in a greater improvement in blood pressure in people with hypertension.

The World Health Organization recommends that adults should consume less than 2,000 mg of sodium (which is contained in 5 g of salt) per day. Guidelines by the United States recommend that people with hypertension, African Americans, and middle-aged and older adults should limit consumption to no more than 1,500 mg of sodium per day and meet the potassium recommendation of 4,700 mg/day with a healthy diet of fruits and vegetables.

While reduction of salt intake to less than 2,300 mg per day is recommended by developed countries, one review recommended that salt intake be no less than 1,200 mg (contained in 3 g) per day, as it is an essential nutrient required from the diet. Another review indicated that reducing sodium intake to lower than 2,300 mg per day may not be beneficial..

3.6 SWEETNERS

Sugar substitute

A sugar substitute is a food additive that provides a sweet taste like that of sugar while containing significantly less food energy. Some sugar substitutes are produced by nature, and others produced synthetically. Those that are not produced by nature are, in general, called artificial sweeteners.

Types of sugar substitutes

An important class of sugar substitutes is known as high-intensity sweeteners. These are compounds with many times the sweetness of sucrose, common table sugar. As a result, much less sweetener is required and energy contribution is often negligible. The sensation of sweetness caused by these compounds (the "sweetness profile") is sometimes notably different from sucrose, so they are often used in complex mixtures that achieve the most natural sweet sensation.

If the sucrose (or other sugar) that is replaced has contributed to the texture of the product, then a bulking agent is often also needed. This may be seen in soft drinks or sweet teas that are labeled as "diet" or "light" that contain artificial sweeteners and often have notably different mouthfeel, or in table sugar replacements that mix maltodextrins with an intense sweetener to achieve satisfactory texture sensation.

In the United States, seven intensely sweet sugar substitutes have been approved for use. They are stevia, aspartame, sucralose, neotame, acesulfame potassium (Ace-K), saccharin, and advantame. Cyclamates are used outside the U.S., but have been prohibited in the U.S. since 1969. Others, which may or may not be approved depending on jurisdiction, include allulose (psicose) and monk fruit. The U.S. Food and Drug Administration regulates artificial sweeteners as food additives. Food additives must be approved by the FDA, which publishes a generally recognized as safe (GRAS) list of additives. Stevia is exempt under the FDA's GRAS policy due to its being a natural substance in wide use well before 1958, and the FDA has approved it on these grounds. The conclusions about safety are based on a detailed review of a large body of information, including hundreds of toxicological and clinical studies.

The majority of sugar substitutes approved for food use are artificially synthesized compounds. However, some bulk natural sugar substitutes are known, including sorbitol and xylitol, which are found in berries, fruit, vegetables, and mushrooms. It is not commercially viable to extract these products from fruits and

vegetables, so they are produced by catalytic hydrogenation of the appropriate reducing sugar. For example, xylose is converted to xylitol, lactose to lactitol, and glucose to sorbitol. Other natural substitutes are known, but these have yet to gain official approval for food use.

Sorbitol and xylitol are examples of sugar alcohols (also known as polyols). These are, in general, less sweet than sucrose but have similar bulk properties and can be used in a wide range of food products. Sometimes the sweetness profile is fine-tuned by mixing these with high-intensity sweeteners. As with all food products, the development of a formulation to replace sucrose is a complex proprietary process.

Use

Sugar substitutes are used instead of sugar for a number of reasons, including:

- To assist in weight loss – Some people choose to limit their food energy intake by replacing high-energy sugar or corn syrup with other sweeteners having little or no food energy. This allows them to eat the same foods they normally would while allowing them to lose weight and avoid other problems associated with excessive caloric intake.
- Dental care – Carbohydrates and sugars usually adhere to the tooth enamel, where bacteria feed upon them and quickly multiply. The bacteria convert the sugar to acids that decay the teeth. Sugar substitutes, unlike sugar, do not erode teeth as they are not fermented by the microflora of the dental plaque. A sweetener that can actually benefit dental health is xylitol, which tends to prevent bacteria from adhering to the tooth surface, thus preventing plaque formation and eventually decay. Xylitol cannot be fermented by bacteria that feed on sugar, so they have difficulty thriving, thus helping to prevent plaque formation.
- Diabetes mellitus – People with diabetes have difficulty regulating their blood sugar levels, and need to limit their sugar intake. Many artificial sweeteners allow sweet tasting food without increasing blood glucose. Others do release energy but are metabolized more slowly, preventing spikes in blood glucose.
- Reactive hypoglycemia – Individuals with reactive hypoglycemia will produce an excess of insulin after quickly absorbing glucose into the bloodstream. This causes their blood glucose levels to fall below the amount needed for proper body and brain function. As a result, like diabetics, they must avoid intake of high-glycemic foods like white bread, and often use artificial sweeteners for sweetness without blood glucose.
- Cost and shelf life – Many sugar substitutes are cheaper than sugar. Sugar substitutes are often lower in total cost because of their long shelf-life and high sweetening intensity. This allows sugar substitutes to be used in products that will not perish after a short period of time.

Common practice

The three primary compounds used as sugar substitutes in the United States are saccharin (e.g., Sweet'N Low), aspartame (e.g., Equal, NutraSweet) and sucralose (e.g., Splenda, Altern). Maltitol and sorbitol are often used, frequently in toothpaste, mouth wash, and in foods such as "no sugar added" ice cream. Erythritol is gaining momentum as a replacement for these other sugar alcohols in foods as it is much less likely to produce gastrointestinal distress when consumed in large amounts. In many other countries, xylitol, cyclamate, and the herbal sweetener stevia are used extensively.

When sweeteners are provided for restaurant customers to add to beverages such as tea and coffee themselves, they are often available in paper packets which can be torn and emptied. In North America, the colors are typically white for sucrose, blue for aspartame, pink for saccharin, yellow for sucralose (United States) or cyclamate (Canada), tan for turbinado, orange for monk fruit extract, and green for stevia.

Food industry use

The food and beverage industry is increasingly replacing sugar or corn syrup with artificial sweeteners in a range of products traditionally containing sugar.

According to market analysts Mintel, a total of 3,920 products containing artificial sweeteners were launched in the U.S. between 2000 and 2005. In 2004 alone, 1,649 artificially sweetened products were launched. According to market analysts Freedonia in 2012, the United States artificial sweetener market is set to grow at around 8% per year.

Aspartame is currently the most popular artificial sweetener in the U.S. food industry, as the price has dropped significantly since its patent registered by Monsanto Company expired in 1992. However, sucralose may soon replace it, as alternative processes to Tate & Lyle's patent seem to be emerging. According to Morgan Stanley, this can mean that the price of sucralose will drop by thirty percent.

Sugar substitutes are highly consumed in America. In 2003–2004, Americans two years of age and older consumed 585 grams (21 oz) per day of beverages and 375 grams (13 oz) per day of foods with caloric sweeteners. More than 66% of Americans consumed these beverages with sugar substitutes and 82.3% of Americans consumed foods with added caloric sweeteners. On the other hand, 10.8% of Americans in 2003–2004 consumed non-caloric sweetener flavored beverages and 5.8% consumed non-caloric sweetener flavored foods.

Some commonly consumed foods with sugar substitutes are diet sodas, cereals, and sugar-free desserts such as ice cream. Sugar substitutes are found in many products today due to their low or non-caloric characteristics. This can be used to market a product to dieters or those conscious of their sugar intake, such as consumers with diabetes. Sugar substitutes such as xylitol and saccharin have many positive research results that show qualities of dental decay prevention, which causes them to be popular for use in chewing gums and toothpaste.

Some Sugar substitutes

Aspartame

Aspartame was discovered in 1965 by James M. Schlatter at the G.D. Searle company. He was working on an anti-ulcer drug and accidentally spilled some aspartame on his hand. When he licked his finger, he noticed that it had a sweet taste. It is an odorless, white crystalline powder that is derived from the two amino acids aspartic acid and phenylalanine. It is about 200 times as sweet as sugar and can be used as a tabletop sweetener or in frozen desserts, gelatins, beverages, and chewing gum. When cooked or stored at high temperatures, aspartame breaks down into its constituent amino acids. This makes aspartame undesirable as a baking sweetener. It is more stable in somewhat acidic conditions, such as in soft drinks.

Though it does not have a bitter aftertaste like saccharin, it may not taste exactly like sugar. When eaten, aspartame is metabolized into its original amino acids. Because it is so intensely sweet, relatively little of it is needed to sweeten a food product, and is thus useful for reducing the number of calories in a product.

The safety of aspartame has been studied extensively since its discovery with research that includes animal studies, clinical and epidemiological research, and postmarketing surveillance, with aspartame being one of the most rigorously tested food ingredients to date. Aspartame has been subject to multiple claims against its safety, including supposed links to cancer as well as complaints of neurological or psychiatric side effects. Multiple peer-reviewed comprehensive review articles and independent reviews by governmental regulatory bodies have analyzed the published research on the safety of aspartame and have found aspartame is safe for consumption at current levels. Aspartame has been deemed safe for human consumption by over 100 regulatory agencies in their respective countries, including the UK Food Standards Agency, the European Food Safety Authority (EFSA) and Canada's Health Canada.

Saccharin

Aside from sugar of lead, saccharin was the first artificial sweetener and was originally synthesized in 1879 by Remsen and Fahlberg. Its sweet taste was discovered by accident. It had been created in an experiment with toluene derivatives. A process for the creation of saccharin from phthalic anhydride was developed in 1950, and, currently, saccharin is created by this process as well as the original process by which it was discovered. It is 300 to 500 times as sweet as sugar (sucrose) and is often used to improve the taste of toothpastes, dietary foods, and dietary beverages. The bitter aftertaste of saccharin is often minimized by blending it with other sweeteners.

Fear about saccharin increased when a 1960 study showed that high levels of saccharin may cause bladder cancer in laboratory rats. In 1977, Canada banned saccharin due to the animal research. In the United States, the FDA considered banning saccharin in 1977, but Congress stepped in and placed a moratorium on such a ban. The moratorium required a warning label and also mandated further study of saccharin safety.

Subsequent to this, it was discovered that saccharin causes cancer in male rats by a mechanism not found in humans. At high doses, saccharin causes a precipitate to form in rat urine. This precipitate damages the cells lining the bladder (urinary bladder urothelial cytotoxicity) and a tumor forms when the cells regenerate (regenerative hyperplasia). According to the International Agency for Research on Cancer, part of the World Health Organization, "Saccharin and its salts was [sic] downgraded from Group 2B, possibly carcinogenic to humans, to Group 3, not classifiable as to carcinogenicity to humans, despite sufficient evidence of carcinogenicity to animals, because it is carcinogenic by a non-DNA-reactive mechanism that is not relevant to humans because of critical interspecies differences in urine composition."

In 2001, the United States repealed the warning label requirement, while the threat of an FDA ban had already been lifted in 1991. Most other countries also permit saccharin, but restrict the levels of use, while other countries have outright banned it.

The EPA has officially removed saccharin and its salts from their list of hazardous constituents and commercial chemical products. In a 14 December 2010, release the EPA stated that saccharin is no longer considered a potential hazard to human health.

Stevia

Stevia has been widely used as a natural sweetener in South America for centuries and in Japan since 1970. Due to its unique characteristics of zero glycemic index and zero calories, it is fast becoming popular in many other countries. In 1987, the FDA issued a ban on stevia because it had not been approved as a food additive, although it continued to be available as a dietary supplement. After being provided with a significant amount of scientific data proving that there was no side-effect of using stevia as a sweetener from companies such as Cargill and Coca-Cola, the FDA gave a "no objection" approval for GRAS status in December 2008 to Truvia, a blend of rebiana and erythritol (developed by Cargill and The Coca-Cola Company), as well as PureVia (developed by PepsiCo and the Whole Earth Sweetener Company, a subsidiary of Merisant), both of which using rebaudioside A derived from the stevia plant. In Australia, the brand Vitarium have used Natvia, a natural stevia sweetener, to do a range on sugar-free children's milk mixes.

Sucralose

Sucralose is a chlorinated sugar that is about 600 times as sweet as sugar. It is produced from sucrose when three chlorine atoms replace three hydroxyl groups. It is used in beverages, frozen desserts, chewing gum, baked goods, and other foods. Unlike other artificial sweeteners, it is stable when heated and can therefore be used in baked and fried goods. The FDA approved sucralose in 1998.

Most of the controversy surrounding Splenda, a sucralose sweetener, is focused not on safety but on its marketing. It has been marketed with the slogan, "Splenda is made from sugar, so it tastes like sugar." Sucralose is prepared from either of two sugars, sucrose or raffinose. With either base sugar, processing replaces three oxygen-hydrogen groups in the sugar molecule with three chlorine atoms.

The "Truth About Splenda" website was created in 2005 by The Sugar Association, an organization representing sugar beet and sugar cane farmers in the United States, to provide its view of sucralose. In December 2004, five separate false-advertising claims were filed by the Sugar Association against Splenda manufacturers Merisant and McNeil Nutritionals for claims made about Splenda related to the slogan, "Made from sugar, so it tastes like sugar". French courts ordered the slogan to no longer be used in France, while in the U.S. the case came to an undisclosed settlement during the trial.

There are few safety concerns pertaining to sucralose and the way sucralose is metabolized suggests a reduced risk of toxicity. For example, sucralose is extremely insoluble in fat and, thus, does not accumulate in fatty tissues; sucralose also does not break down and will dechlorinate only under conditions that are not found during regular digestion (i.e., high heat applied to the powder form of the molecule). Only about 15% of sucralose is absorbed by the body and most of it passes out of the body unchanged.

Check your Progress:

1. Why are the sugar substitutes used?
2. Which are the most popular sugar substitutes ?
3. What is the importance of stevia as sweetener?

3.7 FATS

Fat is one of the three main macronutrients, along with carbohydrate and protein. Fats, also known as triglycerides, are esters of three fatty acid chains and the alcohol glycerol.

The terms "oil", "fat", and "lipid" are often confused. "Oil" normally refers to a fat with short or unsaturated fatty acid chains that is liquid at room temperature, while "fat" may specifically refer to fats that are solids at room temperature. "Lipid" is the general term, as a lipid is not necessarily a triglyceride. Fats, like other lipids, are generally hydrophobic, and are soluble in organic solvents and insoluble in water.

Fat is an important foodstuff for many forms of life, and fats serve both structural and metabolic functions. They are a necessary part of the diet of most heterotrophs (including humans). Some fatty acids that are set free by the digestion of fats are called essential because they cannot be synthesized in the body from simpler constituents. There are two essential fatty acids (EFAs) in human nutrition: alpha-linolenic acid (an omega-3 fatty acid) and linoleic acid (an omega-6 fatty acid). Other lipids needed by the body can be synthesized from these and other fats. Fats and other lipids are broken down in the body by enzymes called lipases produced in the pancreas.

Fats and oils are categorized according to the number and bonding of the carbon atoms in the aliphatic chain. Fats that are saturated fats have no double bonds between the carbons in the chain. Unsaturated fats have one or more double bonded carbons in the chain. The nomenclature is based on the non-acid (non-carbonyl) end of the chain. This end is called the omega end or the n-end. Thus alpha-linolenic acid is called an omega-3 fatty acid because the 3rd carbon from that end is the first double bonded carbon in the chain counting from that end. Some oils and fats have multiple double bonds and are therefore called polyunsaturated fats. Unsaturated fats can be further divided into cis fats, which are the most common in nature, and trans fats, which are rare in nature. Unsaturated fats can be altered by reaction with hydrogen effected by a catalyst. This action, called hydrogenation, tends to break all the double bonds and makes a fully saturated fat. To make vegetable shortening, then, liquid cis-unsaturated fats such as vegetable oils are hydrogenated to produce saturated fats, which have more desirable physical properties e.g., they melt at a desirable temperature (30–40 °C), and store well, whereas polyunsaturated oils go rancid when they react with oxygen in the air. However, trans fats are generated during hydrogenation as contaminants created by an unwanted side reaction on the catalyst during partial hydrogenation. Consumption of such trans fats has shown to increase the risk of coronary heart disease

Saturated fats can stack themselves in a closely packed arrangement, so they can solidify easily and are typically solid at room temperature. For example, animal fats tallow and lard are high in saturated fatty acid content and are solids. Olive and linseed oils on the other hand are unsaturated and liquid.

Fats serve both as energy sources for the body, and as stores for energy in excess of what the body needs immediately. Each gram of fat when burned or metabolized releases about 9 food calories (37 kJ = 8.8 kcal). Fats are broken down in the healthy body to release their constituents, glycerol and fatty acids. Glycerol itself can be converted to glucose by the liver and so become a source of energy.

Check your Progress:

1. What is the difference between oil, fat and lipid
2. How can the fats be used as source of energy and as stores for energy in excess to the body needs ?
3. What is the significance of saturated, mono-saturated and poly-saturated fats in food and nutrition?

3.8 MILK AND MILK PRODUCTS

3.8.1 Milk

Fig 3.56: *Glass of Milk*

Milk is a pale liquid produced by the mammary glands of mammals. It is the primary source of nutrition for infant mammals before they are able to digest other types of food. Early-lactation milk contains colostrum, which carries the mother's antibodies to its young and can reduce the risk of many diseases. It contains many other nutrients including protein and lactose.

As an agricultural product, milk is extracted from non-human mammals during or soon after pregnancy. Dairy farms produced about 730 million tonnes of milk in 2011, from 260 million dairy cows. India is the world's largest producer of milk, and is the leading exporter of skimmed milk powder, yet it exports very few other milk product. The ever increasing rise in domestic demand for dairy products and a large demand-supply gap could lead to India being a net importer of dairy products in the future. New Zealand, the European Union's 28 member states, Australia, and the United States are the world's largest exporters of milk and milk products. China and Russia were the world's largest importers of milk and milk products. Both countries were self-sufficient by 2016 contributing to a worldwide glut of milk.

Throughout the world, there are more than six billion consumers of milk and milk products. Over 750 million people live within dairy farming households.

Types of consumption

There are two distinct types of milk consumption: a natural source of nutrition for all infant mammals and a food product for humans of all ages that is derived from other animals.

For humans, the World Health Organization recommends exclusive breastfeeding for six months and breastfeeding in addition to other food for at least two years. In some cultures it is common to breastfeed children for three to five years, and the period may be longer.

Fresh goats' milk is sometimes substituted for breast milk. This introduces the risk of the child developing electrolyte imbalances, metabolic acidosis, megaloblastic anemia, and a host of allergic reactions.

The Holstein Friesian cattle is the dominant breed in quintessential industrialized dairy farms today

In many cultures of the world, especially the West, humans continue to consume milk beyond infancy, using the milk of other animals (especially cattle, goats and sheep) as a food product. Initially, the ability to digest milk was limited to children as adults did not produce lactase, an enzyme necessary for digesting the lactose in milk. Milk was therefore converted to curd, cheese and other products to reduce the levels of lactose. Thousands of years ago, a chance mutation spread in human populations in Europe that enabled the production of lactase in adulthood. This allowed milk to be used as a new source of nutrition which could sustain populations when other food sources failed. Milk is processed into a variety of dairy products such as cream, butter, yogurt, kefir, ice cream, and cheese. Modern industrial processes use milk to produce casein, whey protein, lactose, condensed milk, powdered milk, and many other food-additives and industrial products.

Whole milk, butter and cream have high levels of saturated fat. The sugar lactose is found only in milk, forsythia flowers, and a few tropical shrubs. The enzyme needed to digest lactose, lactase, reaches its highest levels in the small intestine after birth and then begins a slow decline unless milk is consumed regularly. Those groups who do continue to tolerate milk, however, often have exercised great creativity in using the milk of domesticated ungulates, not only of cattle, but also sheep, goats, yaks, water buffalo, horses, reindeer and camels. The largest producer and consumer of cattle and buffalo milk in the world is India

Pasteurization

Pasteurization is used to kill harmful microorganisms by heating the milk for a short time and then immediately cooling it. The standard high temperature short time (HTST) process produces a 99.999% reduction in the number of bacteria in milk, rendering it safe to drink for up to three weeks if continually refrigerated. Dairies print expiration dateson each container, after which stores remove any unsold milk from their shelves.

A side effect of the heating of pasteurization is that some vitamin and mineral content is lost. Soluble calcium and phosphorus decrease by 5%, thiamin and vitamin B12 by 10%, and vitamin C by 20%. Because losses are small in comparison to the large amount of the two B-vitamins present, milk continues to provide significant amounts of thiamin and vitamin B12. The loss of vitamin C is not nutritionally significant, as milk is not an important dietary source of vitamin C.

A newer process, ultrapasteurization or ultra-high temperature treatment (UHT), heats the milk to a higher temperature for a shorter amount of time. This extends its shelf life and allows the milk to be stored unrefrigerated because of the longer lasting sterilization effect

Microfiltration

Microfiltration is a process that partially replaces pasteurization and produces milk with fewer microorganisms and longer shelf life without a change in the taste of the milk. In this process, cream is separated from the whey and is pasteurized in the usual way, but the whey is forced through ceramic microfilters that trap 99.9% of microorganisms in the milk (as compared to 99.999% killing of microorganisms in standard HTST pasteurization). The whey then is recombined with the pasteurized cream to reconstitute the original milk composition.

Creaming and homogenization

Upon standing for 12 to 24 hours, fresh milk has a tendency to separate into a high-fat cream layer on top of a larger, low-fat milk layer. The cream often is sold as a separate product with its own uses. Today the separation of the cream from the milk usually is accomplished rapidly in centrifugal cream separators. The fat globules rise to the top of a container of milk because fat is less dense than water. The smaller the globules, the more other molecular-level forces prevent this from happening. In fact, the cream rises in cow's milk much more quickly than a simple model would predict: rather than isolated globules, the fat in the milk tends to form into clusters containing about a million globules, held together by a number of minor whey proteins. These clusters rise faster than individual globules can. The fat globules in milk from goats, sheep, and water buffalo do not form clusters as readily and are smaller to begin with, resulting in a slower separation of cream from these milks.

Milk often is homogenized, a treatment that prevents a cream layer from separating out of the milk. The milk is pumped at high pressures through very narrow tubes, breaking up the fat globules through turbulence and cavitation. A greater number of smaller particles possess more total surface area than a smaller number of larger ones, and the original fat globule membranes cannot completely cover them. Casein micelles are attracted to the newly exposed fat surfaces. Nearly one-third of the micelles in the milk end up participating in this new membrane structure. The casein weighs down the globules and interferes with the clustering that accelerated separation. The exposed fat globules are vulnerable to certain enzymes present in milk, which could break down the fats and produce rancid flavors. To prevent this, the enzymes are inactivated by pasteurizing the milk immediately before or during homogenization.

Homogenized milk tastes blander but feels creamier in the mouth than unhomogenized. It is whiter and more resistant to developing off flavors. Creamline (or cream-top) milk is unhomogenized. It may or may not have been pasteurized. Milk that has undergone high-pressure homogenization, sometimes labeled as "ultra-homogenized," has a longer shelf life than milk that has undergone ordinary homogenization at lower pressures

Check your Progress:

1. Describe the importance of pasteurization?
2. Why do we use micro-filtration ?
3. Describe the process of homogenization in milk processing?

3.9 TYPES OF MILK PRODUCTS

This is a list of dairy products. A dairy product is food produced from the milk of mammals. A production plant for the processing of milk is called a dairy or a dairy factory. Dairy farming is a class of agricultural, or an animal husbandry, enterprise, for long-term production of milk, usually from dairy cows but also from goats, sheep and camels, which may be either processed on-site or transported to a dairy factory for processing and eventual retail sale.

Name	Image	Origin	Description
Aarts			Dried fermented milk often mixed with various measures of sugar, salt or oil. Eaten as a snack or reconstituted as a warm

Name	Image	Origin	Description
			beverage in Mongolia.
Amasi		South Africa	The common word for fermented milk that tastes like cottage cheese or plain yogurt. It is very popular in South Africa.
Ayran		Turkey	Turkish beverage of yogurt mixed with cold water and sometimes salt that may be considered a variant of a drink popular throughoutCentral Asia, the Middle East, and South-eastern Europe. *Ayran* is found in the Balkans as well as Turkey and may be present in the North Caucasus, too.[2]

Name	Image	Origin	Description
Baked milk		Eastern Europe	A variety of boiled milk that has been particularly popular in Russia, Ukraine and Belarus. It is made bysimmering milk on low heat for eight hours or longer.

Name	Image	Origin	Description
Basundi		India	An Indian dessert mostly in Bihar, Maharashtra, Gujarat and Karnataka. It is a sweetened dense milk made by boiling milk on low heat until the milk is reduced by half.
Bhuna khoya		Khan garh, Pakistan	A type of khoa specially linked to city of Khan garh in Pakistan.
Blaand		Introduced to Scotland byVikings	A fermented milk product made from whey. It is similar in alcohol content to wine.
Black Kashk		Central Asia	Prepared from yogurt, its production involves several processes.
Booza			An elastic, sticky, high level melt resistant ice cream which should delay melting in the hotter climates of the Arabic countries where it is most commonly found.

Name	Image	Origin	Description
Buffalo curd			A traditional and nutritious dairy product prepared from buffalo milk and it is popular throughout south Asian countries such as India, Pakistan, Sri Lanka and Nepal.
Bulgarian yogurt		Bulgaria	A fermented milk product. In common with all dairy yogurt, Bulgarian yogurt is produced through the bacterialfermentation of milk, using a live culture of Lactobacillus bulgaricus and Streptococcus thermophilus.
Butter			Made by churning fresh or fermented cream or milk. It is generally used as a spread and a condiment, as well as in cooking, such as baking, sauce making, and pan frying. Butter consists of butterfat, milk proteins and water. See also Hard sauce.

Name	Image	Origin	Description
Butterfat			The fatty portion of milk. Milk and cream are often sold according to the amount of butterfat they contain.
Buttermilk			Refers to a number of dairy drinks. Originally, buttermilk was the liquid left behind after churning butter out ofcream. This type of buttermilk is known as *traditional buttermilk.*
Buttermilk koldskål		Denmark	A sweet cold beverage orsoup, made with buttermilkand other ingredients. Pictured is buttermilk koldskål with biscuits.
Buttermilk powder			Used in the production of ice cream as a source of solids, in processed sliced cheese to increase viscosity, as an emulsifier in chocolate products and in dry mixes such as pancake mix, to add dairy flavor and enhance

Name	Image	Origin	Description
			food browning.
Brunost		Norway	Brown cheese is a caramelised brown Scandinavian whey cheese. It is produced and consumed primarily in Norway, and has been described as "quintessentially Norwegian".A variant, made using goat milk, is referred to and sold as geitost (Norwegian for "goat cheese"), sometimes gjetost among Norwegian-Americans. Geitost is made from a mixture of goat's and cow's milk, and ekte geitost ("real geitost") is made with goat's milk only.

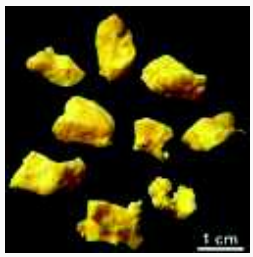
Name	Image	Origin	Description
Cacık		Turkey	A Turkish dish of seasoned, diluted yogurt, eaten throughout the former Ottoman countries. In Greece a similar, much thicker yogurt dish is called tzatziki and is also similar to tarator in Balkan cuisine.
Camel milk			Camel's milk has supported Bedouin, nomad and pastoral cult

Name	Image	Origin	Description
			ures since the domestication of camels millennia ago. Herders may for periods survive solely on the milk when taking the camels on long distances to graze in desert and arid environments. Camel dairy farming is an alternative to cow milk in dry regions of the world.
Casein			The name for a family of related phosphoproteins (αS1, αS2, β, κ). These proteins are commonly found in mammalian milk, making up 80% of the proteins in cow milk and between 20% and 45% of the proteins in human milk.
Caudle			A British thickened and sweetened alcoholic hot drink, somewhat like eggnog. It was popular in the Middle Ages for its supposed medicinal properties.
Chaas			A buttermilk preparation from India. It is consumed all year round where it is usually taken along with meals. It contains raw milk, cream (malai) or yogurt which is blended manually in a pot with an instrument called *madhani* (whipper).

Name	Image	Origin	Description
Chal			A Turkic (especially Turkmen and Kazakh) beverage of fermented camel milk, sparkling white with a sour flavor, popular inCentral Asia — particularly in Kazakhstan and Turkmenistan.[1] In the image, chal is pictured left, along with kumis on the right.
Chalap			A beverage common to Kyrgyzstan and Kazakhstan. It consists of yogurt, salt, and modernly, carbonated water.
Chass			The word used for buttermilk in Rajasthani and Gujarati. Chass is the traditional Gujarati beverage from Gujarat, India. It is similar to, but cheaper than, Lassi.
Cheese			A food derived from milk that is produced in a wide range of flavors, textures, and forms by coagulation of the milk protein casein. It comprises proteins and fat from milk, usually the milk of cows, buffalo, goats, or sheep.
Clabber			Produced by allowing unpasteurized milk to turn sour at a specific humidity and temperature. Over time, the milk thickens or curdles into

Name	Image	Origin	Description
			a yogurt-like substance with a strong, sour flavor.
Clotted cream			A thick cream made by indirectly heating full-cream cow's milk using steam or a water bath and then leaving it in shallow pans to cool slowly. During this time, the cream content rises to the surface and forms 'clots' or 'clouts'. It forms an essential part of acream tea.
Condensed milk			Milk from which water has been removed. It is most often found in the form of sweetened condensed milk, with sugar added.
Cottage cheese			A cheese curd product with a mild flavor. It is drained, but not pressed, so some whey remains and the individual curds remain loose.
Cream			Composed of the higher-butterfat layer skimmed from the top of milk before homogenization. In un-homogenized milk, the fat, which is less dense, will

Name	Image	Origin	Description
			eventually rise to the top.
Cream cheese			A soft, mild-tasting cheese with a high fat content. Traditionally, it is made from unskimmed milk enriched with additional cream. Stabilizers such as carob bean gum and carrageenan are added.
Crème anglaise			A light pouring custard used as a dessert cream or sauce. It is a mix of sugar, egg yolks and hot milk, often flavored with vanilla.
Crème fraîche			A soured cream containing 30–45% butterfat and having a pH of around 4.5. It is soured with bacterial culture, but it is less sour than U.S.-style sour cream and has a lower viscosity and a higher fat content.
Cuajada		Spain	A (milk curd) cheese product. Traditionally it is made from ewe's milk, but now it is more often made industrially from cow's milk. It is popular in the north-eastern regions of Spain (Basque Country, Navarre, Castilla y León, La Rioja).

Name	Image	Origin	Description
Curd			Curd is obtained by *curdling* (coagulating) milk with rennet or an edible acidic substance such as lemon juice or vinegar, and then draining off the liquid portion. The increased acidity causes the milk proteins (casein) to tangle into solid masses, or *curds*.
Curd snack			A type of sweet snack made from curd, popular in the Baltic states – Estonia, Latvia and Lithuania – as well as in Russia, Belarus,Ukraine and Kazakhstan.
Custard			A variety of culinary preparations based on a cooked mixture of milk or cream and egg yolk. Depending on how much egg or thickener is used, custard may vary in consistency from a thin pouring sauce to a thick pastry cream used to fill éclairs.

Name	Image	Origin	Description

Name	Image	Origin	Description
Dadiah		West Sumatra, Indonesia	A traditional fermented milk of West Sumatra, made by pouring fresh raw unheated buffalo milk into abamboo tube capped with a banana leaf, and allowing it to ferment spontaneously at room temperature for two days.
Daigo		Japan	A type of dairy product made in Japan during the 10th century.
Dondurma		Turkey	The name given to ice cream in Turkey. Dondurma typically includes the ingredients milk, sugar, salep, andmastic.
Donkey's milk			The milk given by the domesticated ass or donkey. It has been used since Egyptian antiquity for bothalimentary and cosmetic reasons.

Name	Image	Origin	Description
Dulce de Leche		Popular in South América:Argentina, Chile, Colombia,Ecuador	A dairy product made with milk and sugar; it takes a long cooking time.
Doogh			A yogurt-based beverage. Popular in Iran, Afghanistan, Azerbaijan, Armenia, Iraq, Syria and Turkey, it is sometimes carbonated. Outside of Iran and Afghanistan it is known by different names.

Name	Image	Origin	Description
Evaporated milk			Also known as dehydrated milk, evaporated milk is a shelf-stable canned milk product with about 60% of the water removed from fresh milk. It differs from sweetened condensed milk, which contains added sugar.

Name	Image	Origin	Description

Name	Image	Origin	Description
Filled milk			Any milk, cream, or skim milk that has been reconstituted with fats, usually vegetable oils, from sources other than dairy cows.
Filmjölk		Scandinavia	A Nordic dairy product, similar to yogurt, but using different bacteria which give a different taste and texture.
Feta		Greece	Type of cheese that is found in Greece.
Fromage frais		north of France and the south ofBelgium	The name means "fresh cheese" in French (*fromage blanc* translates as "white cheese").
Fermented milk products			Also known as cultured dairy foods, cultured dairy products, or cultured milk products, fermented milk products are dairy foods that have been fermented with lactic acid bacteria such as Lactobacillus, Lactococcus, and Leuconostoc. Pictured is skyr.
Frozen custard			A cold dessert similar to ice cream, but made with eggs in addition to cream and sugar.

Name	Image	Origin	Description
Frozen yogurt		United States	A frozen dessert made with yogurt and sometimes other dairy products. It varies from slightly to much more tart thanice cream, as well as being lower in fat (due to the use of milk instead of cream).

Name	Image	Origin	Description
Galalith			A synthetic plastic material manufactured by the interaction of casein and formaldehyde
Gelato		Italy	The Italian word for ice cream, derived from the Latin word "gelātus." (meaning frozen). Gelato is made with milk, cream, various sugars, and flavoring such as fresh fruit and nut purees.
Goat milk			Goats produce about 2% of the world's total annual milk supply. Some goats are bred specifically for milk.
Gombe		Sogn og Fjordane,Norway	A traditional dish from Sogn og Fjordane in Norway, it's prepared from curdled unpasteurized milk which is boiled down with sugar for several hours.

Name	Image	Origin	Description
Gomme		Norway	A traditional Norwegian dish used for dinner or dessert, gomme is a sort of sweet cheese made of long-boiled milk, having a yellow or brown color. A white, porridge-like variant made of milk and oat grains or rice also exists.

Name	Image	Origin	Description
Horse milk			Products collected from living horses include mare's milk, used by people with large horse herds, such as the Mongols, who let it ferment to produce kumis.

Name	Image	Origin	Description
Ice cream			A frozen dessert usually made from dairy products, such as milk and cream and often combined with fruits or other ingredients and flavors.
Ice milk			A frozen dessert with less than 10 percent milkfat and the same sweetener content as ice cream.

Name	Image	Origin	Description
Indian dairy products			A variety of dairy projects are indigenous to India and an important part of Indian cuisine. The majority of these products can be broadly classified into curdled products, like chhena, or non-curdled products, like khoa. Pictured is Paneer.
Infant formula			A manufactured food designed and marketed for feeding to babies and infants under 12 months of age, usually prepared forbottle-feeding or cup-feeding from powder (mixed with water) or liquid (with or without additional water).

Name	Image	Origin	Description
Junket			A milk-based dessert, made with sweetened milk and rennet, the digestive enzyme which curdles milk.

Name	Image	Origin	Description
Kashk, aaruul,chortan, qurut			A large family of foods found in Caucasian, Central Asian, Iranian, Levantine, Mongolian, and Turkish cuisines. There are three main kinds of food with this name: foods based on curdled milk products like yogurt or cheese are

Name	Image	Origin	Description
			within the realm of dairy products.
Kaymak		Turkey	A creamy dairy product, similar to clotted cream. It is made from the milk of water buffalos or of cows.
Kefir		Caucasus	A fermented milk drink prepared by inoculating cow, goat, or sheep milk with kefir grains.
Khoa			A milk food widely used in Indian and Pakistani cuisine, made of either dried whole milk or milk thickened by heating in an open iron pan.
Kulfi			A popular frozen dairy dessert from the Indian Subcontinent. It is often described as "traditional Indian Subcontinent ice cream".

Name	Image	Origin	Description
Kumis		Central Asia,Mongolia	A fermented dairy product traditionally made from mare's milk. The drink remains important to the peoples of the Central Asian steppes, of Huno-Bulgar, Turkic and Mongol origin: Bashkirs, Kalmyks, Kazakhs, Kyrgyz, Mongols, Uyghurs, andYakuts.

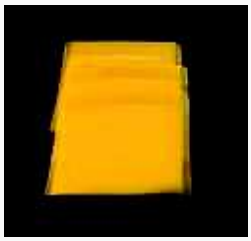
Name	Image	Origin	Description
Lassi		Punjab region of India and Pakistan	A popular, traditional, yogurt-based drink consisting of a blend of yogurt, water, spices, and sometimes, fruit.
Leben (labneh)			A fermented milk product commonly available in the Arab world

Name	Image	Origin	Description
Malai			Similar to clotted cream. It is made by heating non-homogenized whole milk to about 80 °C (180 °F) for about one hour and then allowing to cool.
Matzoon		Armenia	A fermented milk product of Armenian origin made from cow's milk (mostly), goat's milk, sheep's milk, or a mix of them and a culture from previous productions. In Georgia

Name	Image	Origin	Description
			it is known as *matsoni*.
Milk			A white liquid produced by the mammary glands of mammals. It is the primary source of nutrition for young mammals before they are able to digest other types of food. See also Milkshake.
Milk skin			A sticky film of protein that forms on top of milk and milk-containing liquids (such as hot chocolate and some soups). It is caused by the denaturation of proteins such as casein. In Japan, a dairy product called So was made from layers of milk skin during the 7th-10th centuries.
Míša		Czech Republic	A popular Czech confection made with frozen cream cheese
Mitha Dahi			A fermented sweet dahi or sweet yogurt. This type of yogurt is common in the states of West Bengal and Odisha in India, and inBangladesh.[1]
Moose milk			Pictured is a milkmaid collecting moose milk at Kostroma Moose Farm in Kostroma Oblast, Russia.

Name	Image	Origin	Description
Mursik		Kenya	A basic element of the cuisine of the Kalenjin people of Kenya. Made from curdled dairy products cooked in a specially made gourdcontainer, it is commonly served at dinner.

Name	Image	Origin	Description
Paneer			fresh cheese common in South Asian cuisine. In northern parts of the Indian Subcontinent, it is generally called Chhena. It is an unaged, acid-set, non-melting farmer cheese or curd cheese made by curdling heated milk with lemon juice, vinegar, or any other food acids.
Podmleč		Serbia	Western Serbian dairy product similar to clotted cream. It is made from the milk of goats or of cows.
Pomazánkové máslo			A traditional Czech and Slovak dairy product, it is a spread made from base ingredients of sour cream, milk powder andbuttermilk powder.
Powdered milk			a manufactured dairy product made by evaporating milk to dryness. One purpose of drying milk is to preserve it; milk powder has a far longer shelf life than liquid milk and does not need to be refrigerated, due to its low moisture content.

Name	Image	Origin	Description
Processed cheese			A food product made from normal cheese and sometimes other unfermented dairy ingredients, plus emulsifiers, extra salt, food colorings, or whey. Many flavors, colors, and textures of processed cheese exist.
Pytia			Curdled milk obtained from an animal's stomach, containing (and used as) rennet.

Name	Image	Origin	Description
Qimiq			Consists of 99% light cream and 1% gelatine; it was invented in 1995 and is patented by Hama Foodservice GmbH.
Quark			A fresh dairy product made by warming soured milk until the desired degree of denaturation of milk proteins is met, and then strained.
Qatiq			a fermented milk drink from the Turkic countries and Bulgaria.

Name	Image	Origin	Description
Reindeer milk			Reindeer have been herded for centuries by several Arctic and Subarctic people including the Sami and the Nenets. They are raised for their meat, hides, and antlers and, to a lesser extent, for milk and transportation.
Ryazhenka		Ukraine	Fermented baked milk

Name	Image	Origin	Description
Semifreddo			A class of semi-frozen desserts, typically ice-cream cakes, semi-frozen custards, and certain fruit tarts. It has the texture of frozen mousse because it is usually produced by uniting two equal parts of ice cream and whipped cream.
Sergem		Tibet	A Tibetan food made from milk once the butter from the milk is extracted. It is then put in a vessel and heated and when it is about to boil, sour liquid call "chakeu" is add and this leads to the separation of sergem from that milk.

Name	Image	Origin	Description
Sheep milk			Also known as ewe's milk, it's the milk of domestic sheep. Though not widely drunk in any modern culture, sheep's milk is commonly used to make cultured dairy products.
Shrikhand		India	An Indian sweet dish made of strained yogurt. It is one of the main desserts in Maharashtrian cuisine and Gujarati cuisine.
Skorup			Kajmak that is matured in dried animal skin sacks is called skorup.
Skyr		Iceland	An Icelandic cultured dairy product, similar to strained yogurt. It has been a part of Icelandic cuisine for over a thousand years.
Smetana		Central and Eastern Europe	A range of sour creams from Central and Eastern Europe. It is a dairy product produced by souring heavy cream.
So		Japan	A type of dairy product that was made in Japan between 7th and 10th centuries.

Name	Image	Origin	Description
Soft serve		United States	A type of ice cream that is softer than regular ice cream, as a result of air being introduced during freezing. Soft serve ice cream has been sold commercially since the late 1930s.
Sour cream			Obtained by fermenting a regular cream with certain kinds of lactic acid bacteria. The bacterial culture, which is introduced either deliberately or naturally, sours and thickens the cream.
Soured milk			Produced from the acidification of milk. It is not the same as spoiled milk that has soured naturally and which may contain toxins. Acidification, which gives the milk a tart taste, is achieved either through the addition of an acid, such as lemon juice or vinegar, or through bacterial fermentation.
Spaghettieis		Mannheim,Germany	A German ice cream made to look like a plate of spaghetti. It was created by Dario Fontanella in the late 1960s in Mannheim, Germany.

Name	Image	Origin	Description
Stewler		Russia,Ukraine	A fermented milk product that is popular in Russia and Ukraine. Símilar to Ryazhenka, it is made by adding sour cream tobaked milk.
Strained yogurt			Yogurt which has been strained in a cloth or paper bag or filter to remove the whey, giving a consistency between that of yogurt and cheese, while preserving yogurt's distinctive sour taste. Pictured is strained yogurt with olive oil.
Súrmjólk		Iceland	A cultured milk product, or a type of yogurt. It is made from either whole or semi-skimmed milk and various flavorings are sometimes added.

Name	Image	Origin	Description
Tarhana			Dehydrated yogurt and grain product, rehydrated with milk to make soup

Name	Image	
Tuttis		

Name	Image
Urdă	
Uunijuusto	

Name	Image
Vaccenic acid	

Name	Image	Origin	Description
Viili			A yogurt-like mesophilic fermented milk that originated in the Nordic countries. It has a ropey, gelatinous consistency and a pleasantly mild taste resulting from lactic acid.
Vla		Netherlands	A type of custard (known in the United States as cornstarch pudding).

Name	Image	Origin	Description
Whey			The liquid remaining after milk has been curdled and strained. It is a by-product of the manufacture of cheese or casein and has several commercial uses.
Whey protein			A mixture of globular proteins isolated from whey, the liquid material created as a by-product of cheese production.

Name	Image	Origin	Description
Whipped cream			Cream that has been beaten by a mixer, whisk, or fork until it is light and fluffy. Whipped cream is often sweetened and sometimes flavored with vanilla, and is often called Chantilly cream or crème Chantilly (pronounced: [kʁɛm ʃɑ̃tiji]).

Name	Image	Origin	Description
Yak butter			A staple food item and trade item for herding communities in south Central Asia and the Tibetan Plateau. Many different political entities have communities of herders who produce and consume yak's dairy products including cheese and butter – for example, China, India, Mongolia, Nepal, and Tibet.
Yak milk			Domesticated yaks have been kept for thousands of years, primarily for their milk, fibre and meat, and as beasts of burden.
Yakult		Created byJapanesescientist Minoru Shirota	A probiotic dairy product made by fermenting a mixture of skimmed milk with a special strain of the bacterium *Lactobacillus casei* Shirota.

Name	Image	Origin	Description
Ymer		Denmark	a Danish soured milk product which has been known since 1930. It is made by fermenting whole milk with the bacterialculture *Lactococcus lactis*.
Yogurt			A fermented milk product (soy milk, nut milks such as almond milk, and coconut milk can also be used) produced bybacterial fermentation of milk. The bacteria used to make yogurt are known as "yogurt cultures".

Name	Image	Origin	Description
Žinčica			A drink made of sheep milk whey similar to kefir. It is a by-product in the process of making *bryndza* cheese.

3.10 PURCHASE

Purchasing the Ingredients

Steps:

1. Demand is generated by the kitchen
2. Specifications of the items to be purchased are fixed
3. A supplier is selected (through open market process or through---)
4. Purchase order is prepared
5. Commodity is delivered
6. Delivery note is received at store
7. Item is inspected for qulity and quantity

8. Satisfactory completion of delivery note is prepared and sent to accounts for paymnt
9. Stores section dispatches to the kitchen section the perishable and non-perishable items as per requirements

Issues in Purchase process

1. Some items are seasonal and have price and quality variations with an annual pattern of variation
2. Whether stock of reasonable quantity is to be maintained to keep check on price variation
3. Whether to purchase based on open competition or purchase based on a fixed vendor for a period decided based on open competition
4. Check on quality and quantities

Aids in purchase processes

1. Trade journals
2. Newspapers
3. Government publication
4. Published price indices

Purchase Research

Systematic manner of collecting, classifying and analysing data so as to arrive at the best purchasing decision is called purchase research.

We collect information on product or service to be purchased, the time series analysis on the prices and quality of item (gibing the annual pattern of variation in prices and quality based on long ranges of studies), vendors (their reliability in dispatching matieral, their standing in market, etc), purchase system`

The outcome of the Purchase Research is

1. Cost Analysis Report (involves cost-benefit analysis, to judge whether the price we pay is worth the value we get among other consideration)
2. Contract purchasing report
3. Supplier Rating (A dynamic report of the vendors considering the vendors performance on punctuality, quality and quantities supplied, capability, service and cost or prices of items)
4. Method Report (Which item is to be purchased as periodic purchase method, which items to be stocked, etc)

How to select a supplier?

Following factors are to be considered:

- Supplier's location (speed of delivery, quality of perishable items, cost of transportation depends on where vendor is located)
- Facilities available at Supplier (Storage space, storage conditions, hygiene and sanitation, transportation facilities are important factors)

- Financial Status (ensures that the long term confidence regarding his availability in business can be vested on the vendor)
- Qualification and experience of the staff
- Honesty, integrity and dependability

Purchase Contract and Purchase Order

The following information should be unambiguously (clearly, without causing misunderstanding or misinterpretation) mentioned in the purchase contract or purchase order:

- Name and location of supplier
- Duration of Contract (date of validity)
- Delivery Schedule
- Transportation Clause
- Product Specification (quality and quantities to be supplied, quality marks like agrmark or ISI etc)
- Rate of purchase (with or without taxes, installation, transportation, etc., discount offered,if any)
- Replacement of goods not found suitable
- Penalty on late delivery or insufficient quantity or quality, etc (rate of penalty to be clearly mentioned as per cent per week etc)
- Location where material is to be supplied.
- What would be the criteria for rejection (e.g., date of expiry, date of manufacting, MRP, packing condition, spoilage, nutritional information, ingredients, etc)

Methods of Purchase:

This includes

1. Open market purchase (Competive Purcahse though calling quotations from vendors)
2. Formal Buying through tender (Tender notice though papers, technical bid containing samples, information on financial stability of vendor, etc is opened first to determine the first pass of the scrutiny, the successful vendors in technical scrutiny then complete for the commercial bid, decision is taken to select the best vendor who can supply at the lowest rate and with best quality and services)
3. Direct purchase without competition (for small items whose rates are well known and where quality is normally
4. Whole Sale Buying (Futures) (A contract is signed with the whole sale supplier for purchase of goods at specified prices to be supplied at a future date)

Check your Progress

1. What is meant by Purchase Research?
2. Which are the issues in making a purchase decision?
3. What are the various methods of purchase?

3.11 STORAGE CONSIDERATIONS

There are dry storage rooms meant for non-perishable commodities like cereals, pulses, legumes, sugar and spices, caned foods, fats and oils, and low temperature storage rooms meant for semi perishable and perishable food items. Food items should be stored in areas which will give easy access to staff members and suppliers.

Dry store rooms should be well lighted, visible and identifiable. There should be good ventilation to prevent spoilage and to maintain temperature. The food should be stored with one thumb rule of older food items in front. There should be proper spacing between food items and should be tagged properly.

3.11.1 ORGANIZATION OF STORAGE

Following guide lines will prove helpful in creating a systematic arrangement of food items in storage:

- Arrange food according to the type of commodity.
- Place the stock in alphabetical order of food categories.
- Stamp the date of delivery on every stock received before placing it on shelves.
- Place items on the shelves according to the date stamped.
- Mark prizes on stock. It helps the catering manager to calculate the food cost and the selling prize.
- Arrange products to give an organized appearance and it does not give a messy look.

3.11.2 GENERAL PROCEDURE FOR STORAGE

The following is the general procedure for storage of food items:

(i)JUTE OR POLY BAGS:

Items purchased in bulk quantity like sugar, flour, cereals, pulses should be stacked with maximum of six bags. All open bags should be emptied into bins or containers with tight fighting lids. Cross stacking helps free air circulation.

(ii) CARTOONS AND CASES:

Cartoons of canned food, bisects should be stacked with proper labels.

(iii) TINS AND SMALL CARD BOARDS:

These are generally used for dry fruits, fruit preserves, mixes, jellies. Vegetables and fruits should be stored in separate areas from main dry store. Oils and fats are stored in cold places as they may get spoilt in presence of light. They also absorb odour and flavour from other food items. Low

temperatures are maintained in certain storage areas as they retarded microbial growth. Increasing the life of perishable items.

3.13 SUMMARY

In this Unit, we have studied various ingredients used in kitchen. They include herbs and spices, fruits and vegetables, salt, sweeteners, milk and milk products.

We studied various commonly used herbs, spices, fruits, vegetables, salt, grains, pulses, sweeteners and milk product. This list of such ingredient could have beenvery exhaustive. We limited ourselves to the ingredients whch are available in India or have important roles to play in international cuisines. We studied their culinary uses, storage considerations and purchase processes.

3.14 END QUESTIONS

The following questions should help you prepare for the End Examinations. These questions are for 5 marks each and should take you 11 minutes under examination conditions.

1. Describe the various kinds of ingredients used in cooking.
2. List at least five examples of herbs.
3. List five examples of spices.
4. Describe cereals and pulses and their importance in food.
5. Explain how fruits and vegetables are used in kitchen.
6. Describe how salts and sweeteners are used in cooking.
7. Describe fats and how they are treated in kitchen.
8. List types of milk products.
9. Describe the purchase processes for the ingredients.
10. Describe how various ingredients are stored in kitchen.

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UNIT 4 STOCKS, SAUCES, SOUP AND SALADS

Structure:

4.0 BEFORE WE BEGIN

We are coming to the end of this course on Food Production. We have seen in Unit 1, what is meant by a professional kitchen, how the professional kitchen is organized and how it interacts with the other departments of hotels. In Unit 2, we tried to understand the various kitchen equipments and tried to learn about the safety precautions while handling fuel and fire. In the unit 3, we learned about the various ingredients used in the cooking, how they are stored and procured.

As the next step in honing our skills in Food Production, we will learn about some of the simplest forms of cooking. In this unit you will take first steps towards recipes, learning how to use the kitchen equipment taking due care using the information which you gathered and learned in the previous units. You would learn how to actually use the ingredients in preparing basic dishes.

You will learn in this unit about the stock, sauces and soups. The stock are prepared by boiling bones with vegetables. They form foundations for various other dishes. They enhance the flavor and hence the value of the main dishes. You are all aware of the sauces and ketchups. These are available in markets as ready-made product. We are going to study them in systematic manner. We will learn how they are classified, what are the various ingredients, how they are prepared and how you can make variations in the basic or mother sauces. We will also try to learn the recent trends in sauces. We will then move on to soups. The knowledge of soup depends on the knowledge of stock and soups. Many concepts which you will learn in the earlier sections of the unit will apply to the later sections. Hence we urge you to pay attentions to each of the sections.

Knowledge of soup, sauce and stock will help you become a professional of high caliber as you would gain experience of implementing recipes and altering them to suit the clientele which you serve. You would apply the knowledge and skills gained in learning of the previous units like how to handle kitchen equipments with safety precautions duly taken. Let us now move to learn stock, soup and sauce.

4.1 UNIT OBJECTIVES:

After studying this unit you will be able to

- ✓ Describe what is meant by the term “stock”.
- ✓ Classify stock
- ✓ Describe the uses of stock
- ✓ Discuss how the stock is prepared
- ✓ Explain what is meant by the term “sauce”
- ✓ Discuss how sauce is classified
- ✓ Discuss what is meant by thickening agenets and how they are used.
- ✓ Explain the process of preparation of mother sauce.
- ✓ Discuss what is meant by the derivatives of sauce.
- ✓ Describe the properties of sauce.
- ✓ Describe the process of preparation of sauce
- ✓ Explain what makes a sauce a good quality sauce

- ✓ Discuss the emerging trends in sauce
- ✓ Explain what is meant by the term “soup”
- ✓ Discuss how soup is classified
- ✓ Describe the salient features of soup.
- ✓ Describe the process of preparation of soup.
- ✓ Explain what cares and precautions are to be taken while preparing soup
- ✓ Discuss the emerging trends in soup.
- ✓ Describe the concept of “Salad”
- ✓ Discuss how Salads are classified
- ✓ List various types of salads.
- ✓ Describe the process of preparation of a salad.
- ✓ Discuss the emerging trends in salads.

4.2 INTRODUCTION TO STOCK

Stocks form the base ingredient for various dishes in almost all cuisines available globally, each having their stock prepared in their own way to enhance the flavor and taste of the dish prepared. We have seen traditional dishes of Oriental Cuisine (cuisine of S.E. Asian countries, like China, Vietnam, Korea, Mongolia, Vietnam, etc) for which a stock is always required to prepare their dishes. Trace of evidence can be found in the Indian Cuisine, with dishes like Yakhni Pulao, a Kashmiri favorite, where “Yakhni” refers to the mutton stock prepared with aromatics, which gives the main flavoring to the dish.

The French word ‘stock’ translates to ‘fond’ which literally means foundation or base. Stocks are considered an important ingredient and form the base of several dishes. Preparing good stocks is regarded as one of the most basic skills as a lot of work of kitchen depends on them. A stock is the foundation of soups, sauces, stews and most braised foods.

In the modern kitchen, stocks have lost the importance they once had. Increased reliance on portion control meats has made bones for stocks a rarity in most establishments. Also, preparing stocks requires extra labour, which most restaurants today are not able to provide. So, most food items are served without stocks and sauces. Nevertheless, a good cuisine still depends on soups and sauces prepared with high-quality stocks. So, stock making remains an essential skill. Stocks and sauces act as basic ingredients of a variety of dishes and are never served by themselves.

A stock refers to a clear, thin liquid flavoured by soluble substances extracted from vegetables and seasonings, meat, poultry, and fish and their bones. Preparing stocks requires combining correct ingredients in correct quantities by following the proper procedure.

Stocks are nutritious, aromatic, strong-flavoured liquids. These are foundation liquids which are used in the preparation of various dishes such as soups, sauces, gravies, stews, curries, braising, rice and cold dishes.

A stock can be defined as an aromatic and nutritive liquid obtained by simmering ingredients mainly bones and flavoring vegetables in water for a period of time which varies due to the type and size of the ingredients. The uses of stock is varied and is widely used as the foundation liquid in making soups, sauces, essence, glazes, etc. For delicately flavored fish stock, the simmering should not exceed 20 minutes, for white stock around 45 minutes and for brown stock around six to eight hours, or else all flavors and nutrients will be lost, thus losing the objective of cooking. On boiling the stock there is also a chance of making the stock cloudy, i.e., not clear as it should appear.

Stocks generally have 3 elements, water, bones and vegetables, where the flavors are dissolved in water, which is the medium used to make a stock. The type of bones will depend on the dish to be prepared, i.e., for a chicken dish the stock used is preferably chicken to enhance the flavor of the dish. The bones are sometimes the leftovers of boneless preparations and so only bones are to be used for making stock. No meat should be used otherwise as meats are used in preparing dishes and have an economical value. Vegetables are soft in nature and so while making a brown stock it is advisable to add the vegetables towards the end and not cooked more than an hour or else they will get mashed and also impart a bitter taste to the stock. Bones are porous and so prolonged simmering at low temperature is sometimes the best method. Cooking at high temperature (boiling) may seal the pores and so not very advisable. Boiling rapidly may also destroy the nutritive value of the nutrients present and there may be considerable loss in flavors. It is also important to skim the stock in regular intervals to remove all dirt and impurities otherwise these impurities may affect the taste of the stock and also make it cloudy.

The flavoring vegetables used for making stock is generally referred to as ***mirepoix***, which consists of carrots, onions, leeks and celery. They are cut into rough cuts with their sizes depending on the nature and time taken for the stock to be ready, i.e., smaller cuts for quick stocks and larger cuts for stocks taking longer time. Other herbs and spices that are used are generally peppercorn and bay leaf. These six ingredients are the most common flavorings in all continental stocks. There are variations in making where the chef prefers to add certain ingredients as per the nature of the dish. Sometimes thyme, parsley stalks or mushroom stalks are also added to increase the flavor if the dish demands such flavors. Sometimes theses herbs are tied in a piece of cloth, called bouquet garni, for easy removal from the liquid. Once ready with adequate flavors and aroma, the stock is strained off all the ingredients to a lightly color clear liquid with intense flavor and maximum nutrients. This liquid now becomes the foundation liquid for a number of dishes especially soups, sauces, essences and glazes.

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Check your progress -1

What is a stock:

a) Ingredients kept in store for ready use
b) Mixture of bone, water and vegetables which may act as flavor enhancer and may be added to another food item

c) Food preparation used by kneading butter and flour in equal proportion
d) Entry made in a register about the quantities available in the store of a kitchen

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4.3 CLASSIFICATION OF STOCK

There are different kinds of stock in the western culinary world. The following are the most important and popularly used stocks in the hotel kitchens.

i) **White Stock / White Chicken stock :** (Fond blanc / Fond de vollaileblanc)

ii) **Brown Stock (Estouffade) :** Authentically made from beef shin bones with the exception in India where other kinds of bones are substituted for religious purpose.

iii) **Fish Stock (Fumet) :** A basic ingredient for making fish sauces and fish based soups.

iv) **Vegetable Stock :** As per the definition of stock there should have been no existence of a vegetable stock as the elements of stock refers to one important ingredient i.e. bones, addition of which will not make the stock vegetarian. So vegetable stock it is just a vegetarian option of the stocks prepared without the use of any bones. The mirepoix remains unchanged in the recipe with the addition of certain ingredient which forms the main flavoring of the dish. To make a vegetable Broccoli soup, a vegetable stock is required in which the unwanted broccoli stalk (stem) can be added for the extra flavor.

v) **Emergency Stock :** Another type of stock which is very different from the conventional stocks. When the stocks are made instantaneously by using smaller cut ingredients, so that the stock is prepared within a very short time. Now-a-days ready-made stocks are available in the market which when dissolved in water gives stocks within a minute. They are conveniently used in emergency situations when time becomes a factor to make a stock initially as a pre-preparatory produced. They are not as flavorful as stocks made in orthodox style but helpful in extreme situations of unavailability.

vi) Essences and Glazes : Essences are very strongly flavored stocks in which the proportion of the bones are much more than the general quantity used in making stocks. Thus essences are very strongly flavored and when used in very small quantity does the job of large quantizes of stock.

When these essences are prepared with limited quantity of liquid and the strongly flavored liquid is reduced to a minimum, the gelatin present in the bones makes the product like a jelly like substance called meat glaze. They are strongly flavored and are used to improve the presentation effect of cold meats by giving a brilliant shine to the meat as well as imparting more flavor to the cold meats as meats generally tastes bland when served cold. Essences and glazes are used to enhance the flavor of the prepared sauce which might lack in flavor.

Neutral Stock : The stock that is used in the kitchen as an all purpose stock, which in generally chicken stock in India.

Alternatively, some experts classify the stocks in the following manner:

Stocks can be classified into the following two categories:

(i) Basic white stocks: These include white beef stock, white mutton stock, white veal stock, white chicken stock and fish stock. Figure C3 displays basic white stocks.

(ii) Basic brown stocks: These include brown beef stock (Estouffade), brown mutton stock, brown veal stock and brown game stock.

(iii) GLAZES

A glaze is a French word and it refers to a stock which has been reduced by $3/4^{th}$ or more until is coats the back of a spoon. It is so concentrated that it becomes solid and rubbery on being refrigerated.

TYPES OF GLAZES

The following are the types of glazes:

Meat glaze: It is made from brown stock.

Chicken glaze: It is made from chicken stock.

Fish glaze: It is made from fish stock.

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Check your progress -2

Ready-made stock available in market may be treated as an example of :

a) White Stock
b) Brown Stock (Estouffade)
c) Fish Stock (Fumet)
d) Emergency Stock

4.4 USE OF STOCK

Stocks are also called fonds. This means “foundation”. The stocks are foundations for making various other dishes like soups, souces, etc. Hence the skill learned in making stocks is supposed to be a very important skill. You will learn about concepts like clarification in preparing the soups. The skill of clarification is one of the essesential skill in preparing stock as well as clear soups.

USES OF GLAZES

The following are the main uses of glazes:

- It is used as flavouring in sauce making and meat, poultry, fish and vegetable preparation. It is added in small amounts as it is highly concentrated.
- It is used for enriching sautéed meats and for decorating finished hot or cold dishes.

- It gives a brilliant and glossy coating to dishes and improves there appearance.

Points to be observed while making a stock

The following points must be kept in mind while making a stock:

- All the fat should be removed from bones at the beginning, otherwise the stock becomes very greasy and stale quickly.
- The marrow must be removed and put aside to be used as a separate dish(marrow toast) or as a garnish(petit marmite,i.e., a soup).
- Stock should only simmer. If allowed to boil, agitation of fat particles may cause an emulsification, thereby making the stock milky and cloudy.
- Bouquet garni should be tied to the handle of the stock-pot. Vegetables should be added later as addition of vegetables may flavour the stock. If allowed to remain in the pot for too long, the vegetables will begin to disintegrate, thereby discolouring the stock.
- The scum should be discarded.
- The stock should be strained and the liquid should be cooled before storing it. No fat should be allowed to remain on the surface, as heat is prevented from escaping and may cause the stock to turn sour.
- Stocks should always be stored in a refrigerator or in a cold room.
- If not boiled properly, stocks tend to turn cloudy. Straining and skimming should also be done carefully; otherwise it may spoil the stock.

4.5 PREPARATION OF STOCK

WHITE CHICKEN/VEAL/BEEF STOCK

A good white stock has a rich flavour, clarity and little or no colour.

Ingredients	Quantity
Chicken,veal,beef bones	5-6 kg
Cold water	10-12 litres
Mirepoix	
Onion chopped	500 gm
Carrot chopped	250 gm
Celery	250 gm
Sachet	
Bay leaf	1
Thyme	1 gm
Peppercorn	1 gm
Parsley stem	6-8 gm

Whole cloves	2

METHOD

Cut the beef or veal bones into small pieces. Rinse the bones in cold water.
Blanch the bones, place them in cold water in a stock pot and bring to boil. Drain and rinse.
Place the blanched bones in the stock pot and cover with fresh cold water. Bring to boil, lower the heat to simmer and carefully skim off the scum that rises to the surface.
Add the mirepoix and sachet ingredients.

Simmer skimming the surface (for beef and veal 6/8hrs; chicken 2/3hrs), keep the bones covered with water all the time.

Remove the mirepoix and sachet after an hour as the vegetables gets disintegrated making the stock cloudy.

Strain the stock through a sieve lined by several layers of cheese cloth.

BROWN BEEF/ VEAL MUTTON
In the brown stock the bones and the mirepoix are browned before use.

Ingredients	Quantity
Veal/beef/mutton/bones	5/6 kg
Cold water	10-12 ltr
Mirepoix	
Chopped onions	500gms
Chopped carrot	250gms
Chopped celery	250gms
Tomato puree	500gms
Bouquet garni	
Bye leaf	1
Thyme	1
Peppercorns	1gms
Parsley steam	6/7 sprig
Whole clove	2

METHOD

- Cut the whole meat bones into small pieces of 3-4 inches.
- Roast and brown the bones in a roasting pan around 200 degreesCelsius.
- Remove the bones from the pan and place them in a stock pot. Add water to cover the bones and bring to simmer. Remove the scum while simmering.
- Drain the fat in the roasting pan. Deglaze the pan with water and add to the stock pot.

- Toss the mierpoix with a little reserved fat and brown well in the oven.
- Add the browned mirepoix tomato puree and bouquet garni to the stock pot.
- Simmer to about 8/10 hrs removing the scum. Keep the bones covered with water.
- Strain to a sieve with layers of cheese cloth.
- Cool the stock and refrigerate.

FISH STOCK

Ingredients	Quantity
Butter	30grms
Mirepoix	
Chopped onions	125gms
Chopped fine celery	60gms
Chopped carrot	60gms
Mushroom	60gms
Bones from fish	2/3kg
White wine	250ml
Cold water	4ltr
Bouquet garni	
Bay leaf	½
Peppercorns	1gms
Parsley	6/8 stems

METHOD

- Add butter to a stock pot.
- Place the mirepoix at the bottom of the pot and the bones over the top of it. Cover the bones with brown pepper.
- Set the pot over low heat and cook slowly for about 5 minutes.
- Add wine and bring to a simmer. Then add the bouquet garni and little water.
- Bring to a simmer again and remove the scum, simmer it about 30-45 minutes.
- Strain through a strainer covered with cheesecloth.
- Cool and refrigerate.

METHODS FOR PREPARING GLAZES

- Apply moderate heat to stock and reduce it.
- Skim the scum from the surface at regular intervals.
- Reduce the stock to the 2/3rd of its consistency.
- Strain in another pan and continue to reduce till it coats the back of the spoon.

- Pour the content in a container and refrigerator.

Check your progress -3

Mirepoix is :

a) Fresh herbs of various types that are tied or placed in cloth pocket (for easy removal) to be used as flavoring agent
b) Stock made from white meat bones
c) Flavoring of stock consisting of diced vegetables or carrots, etc and bouquet garni
d) Emergency Stock

4.6 INTRODUCTION TO SAUCE

Like stocks, sauces have lost some of the importance they once had in commercial kitchens—except, of course, in the best restaurants serving what may be considered luxury cuisine. Some of this decline is due to changes in eating habits and to increased labor costs.

In fact, many chefs believe good sauces are the pinnacle of all cooking, both in the skill they require and in the interest and excitement they can give to food. Very often, the most memorable part of a really fine meal is the sauce that enhances the meat or fish.

A sauce works like a seasoning. It enhances and accents the flavor of the food; it should not dominate or hide the food.

A good cook knows that sauces are as valuable as salt and pepper. A simple grilled steak is made even better when it has an added touch, something as simple as a slice of seasoned butter melting on it or as refined as a spoonful of béarnaise sauce.

No matter where you work, sauce-making techniques are basic skills you will need in all your cooking. Croquettes, soufflés, and mousses have sauces as their base, nearly all braised foods are served with sauces made of their cooking liquids, and basic pan gravies,favorites everywhere,are made with the same techniques as the classic sauces.

A good sauce is that which makes excellent food still better. To make it, or as it is often a work of art, let us say, create it, calls for precision and knowledge gained from experience exercised with patience and disciplined attention. A keen sense of smell, a delicate sense of taste, a light, strong hand for the blending all must contribute to the perfect sauce.

DEFINITION : Sauces are **liquid** or **semi-liquid** mixtures which are added to meat, poultry, fish, vegetables and desserts to give ***moisture*** **or** ***richness, to garnish*** or to otherwise ***enhance the appearance*** and in some cases the ***nutritional value***, but more importantly ***to better the flavor***. The principal purpose of a sauce then is **to** ***add or enhance the flavor of food.***

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4.7 CLASSIFICATION OF SAUCE

Sauces may be classified by several ways. Here is one system.

1. By serving temperature warm or cold
2. By flavor: blandness or piquancy
3. By acidity
4. By sweetness
5. By color
6. By base: neutral or meat.

In general Sauce can be classified under two major heads as follows:

1 Proprietary Sauce

2 Preparatory Sauce

Proprietary Sauces

The dictionary meaning:

Proprietary: Of the owner, or Held in private ownership, or Manufacture and sale of which is restricted by patent.

Sauces:

Hot or cold seasoned liquid, which is served with or used in the cooking of a dish. Came from the Latin word "Salsas" , which means 'salted'.

The commercial preparation of Proprietary sauces is of very recent origin, during the 18th and 19th century a lot of expansion in the world trade brought about the exchange of ideas and new ingredients. In the process of launching new products various companies entered the foray but very few could survive. The ones, which did, were known by the proprietor's name.

Proprietary Sauces Denotes:

- ✓ Sauces that are not made in the kitchen, but can be purchased from the market.
- ✓ They are imported or procured locally.
- ✓ They have a unique taste which cannot be reproduced by anybody.
- ✓ It has a secret recipe, guarded by patents.
- ✓ They are multi purpose in their use.

Tomato Ketchup

Name from Malay word 'KETJAP' (brine in which fish is pickled) - where ketchup based on Fish and Shellfish are popular.
Indian Taste – Chilies.
Other popular Ketchups - Mushroom, Pineapple, Jackfruit.

Brand Name: Maggie / Heinz
Capacity: 400/ 200 Gms
Ingredients:
Tomato paste, Spices, Water, Garlic powder, Permitted Class II preservatives, sugar, salt, acetic acid, onion powder.

Heinz Tomato Ketchup

Fig 4.01: *Heinz Tomato Ketchup*

Made a humble beginning in Pittsburg in 1869. The first product was horseradish, and the glass of its bottle was clear. Founder Henry John Heinz took his stand on quality and proudly displayed his product in transparent bottles. See? No leaves, no wood fiber, no turnip filler. In 1886, Heinz sailed with his family to England, including in his luggage a Gladstone bag packed with "seven varieties of finest and newest goods. Became a Purveyor to the Queen and most British food shoppers came to regard Heinz as a British company. No artificial preservatives colourings or emulsifiers are added to the Ketchup

Service method:
Poured into a monkey dish/ chutney pot with under liner.
Small bottle may be put on the table. **Served with omelet's, poached fish, fried foods etc.**

HP Sauce

HP Sauce is the only genuine and original brown sauce, which since 1899 has set the standard for quality. Everyone's favourite, this legendary and uniquely distinctive taste sensation is the result of HP's dedication to sourcing the highest quality ingredients and using a closely guarded secret recipe.
HP Sauce the original and the best!
Everything goes well with HP Sauce. Great for spicing up chips, bacon sandwiches, sausages and snacks such as jacket potatoes and baked beans.
By appointment to her Majesty the Queen. HP Foods Ltd - Part of the Danone Group.
100% natural. No artificial colour. No artificial preservatives. No artificial flavours. Low in fat. Suitable for Vegetarians.
Ingredients: Malt vinegar, tomatoes, molasses, spirit vinegar, sugar, dates, salt, corn flour, rye flour, tamarinds, soy sauce, spices, onion extract.
100gm has 0.2gm fat, 27.1gm carbohydrate, 1.1gm protein, and 507KJ energy.
Brand Name: HP Foods limited, U.K
Capacity: 255 gms

Ingredients: Malt vinegar, spirit vinegar, tomatoes, dates, sugar, molasses, spices, tamarind, mustard, flavorings, raisins, salt, rye flour, soy sauce, onion extract.
Service : Served with steaks, stews & burgers

Fig 4.02: *HP Sauce*

TABASCO

TABASCO® brand products are produced by McIlhenny Company, founded in 1868 at Avery Island, Louisiana, and still in operation on that very site today.

Fig 4.03: *Tabasco pepper sauce*

The Company's roots were actually cultivated a few years earlier, shortly after the McIlhenny family returned to the Island from self-imposed exile during the Civil War. According to family tradition, founder Edmund McIlhenny obtained some hot pepper seeds from a traveler who had recently arrived in Louisiana from Central America. McIlhenny planted them on Avery Island, and then experimented with pepper sauces until he hit upon one he liked.
By 1868 Edmund McIlhenny began making pepper sauce, and during the early 1870's his concoction found its way to New York City, where a major nineteenth-century wholesale grocery firm, E.C. Hazard and Company, helped to introduce the product to the northeastern U.S. and beyond.
Tradition holds that McIlhenny first used discarded cologne bottles topped with sprinkler fitments for distributing his sauce, important since his pepper sauce was concentrated and was best used when sprinkled, not poured on. The ever-inventive McIlhenny washed the used bottles thoroughly, and made up labels himself. Sales grew, and by the late 1870's he even sold his sauce in England.

Only One TABASCO®

In 1870, Edmund McIlhenny received letters patent for his unique formula for processing peppers into a fiery red sauce.
That same process is still in use today, and Avery Island remains the headquarters for the worldwide company, which is still owned and operated by direct descendants of Edmund McIlhenny.

The home of world-famous TABASCO® Sauce, Avery Island lies about 140 miles west of New Orleans. It's one of five salt dome islands rising above the flat Louisiana Gulf coast. Geologists believe these mysterious elevations were created when a saltwater ocean covering what is now Texas, Louisiana and Mississippi evaporated—leaving behind a vast sheet of salt.

Brand Name : Mc Ilhenny Co. USA
Capacity : 60 ml
Ingredients : Red pepper and vinegar, Avery island salt

WORCESTERSHIRE SAUCE

Worcestershire[1] Sauce has an interesting history. It was brought back from India by Lord Marcus Sandys, ex-Governor of Bengal, who gave it to two local chemists, John Lea and William Perrins, with an order for a large batch to be made up from his recipe. A few weeks later he returned to pick up the sauce, only to proclaim upon sampling some that it tasted filthy and was nothing like how it should be, and left in disgust.
Nothing more was thought of this until the chemists discovered it at the back of their stores a few months later, and they decided to give it just one more try before tipping it down the drain. To their surprise, the foul-tasting anchovy broth, after being left to ferment, had matured into an interesting spicy condiment, and they immediately purchased the recipe from Lord Marcus. So thanks to this chance retasting,1838 saw the UK's best-known sauce launched, and the name of Worcestershire Sauce (originally called just Worcester Sauce), has spread to be mispronounced by many a foreigner in every corner of this spherical world.
The main ingredients involved in the making of the Worcestershire sauce (as listed on the bottle) are:

Malt Vinegar, Spirit Vinegar, Molasses, Sugar, Salt, Anchovies, Tamarinds, Shallots or Onions, Garlic, Spices and Flavouring.

The first step is to lightly crush the British onions, French garlic and Danish shallots. These are then stored and aged in barrels of malt vinegar.
Once they are sufficiently matured, they are transferred to huge vats and mixed with Spanish salted anchovies, black tamarinds from Calcutta, red hot chillies from China, cloves from Madagascar and black

strap molasses from the Caribbean.
The process of mixing, stirring and pumping continues until the sauce is ready, at which point it is strained and bottled. It takes up to two years to make a bottle of Lea & Perrins Worcestershire Sauce.

The Secret Sauce

From just a handful of ingredients including, of course, a secret one, the Lea & Perrins Worcestershire Sauce we find gracing our tables today has hardly changed from the original blend, which first matured in 1837.
The full recipe has been kept hidden for over 160 years. Only 3 or 4 people at a time know what that special secret ingredient that gives it that extra kick is. Developed by chemists Mr Lea and Mr Perrins, they passed the knowledge to their two sons. They in turn passed it on to a select few.
Following the Second World War, it was decided that no one person should be aware of the whole secret so it was broken up. They even gave the ingredients code names to secure the secret further!
To this day, that entire recipe is still a mystery
Wooster sauce is a pungent aromatic and sweet and sour sauce with some sediments visible in the bottle. The precipitate being very essential and the bottle has to be shaken before use.
The sauce is matured for 6 months to bring out the full flavor, pasteurized and then bottled.

Brand Name : Lea and Perrins
Capacity : 284 ml
Ingredients : Vinegar, molasses, sugar, onions, anchovies, tamarind, garlic, salt, spices. Thin dark brown pungent sauce with a visible sediment.
Accompanies : Goes well with steaks. Used in the bar. Used in gravies, soups & casseroles and used in many classical French recipes and also as an accompaniment to cocktails and also a part of some.

English Mustard

Mustard was grown in the British Isles since time immemorial but it was the Romans who used them the most in their culinaria. The first mustard powder came into being when a certain Mrs. Clements crushed the seeds and then sifted them to make the powder. The heir to the firm Jeremiah Colman, a miller from Norwich made the powder very famous, infact it got him so much fame he stuck to manufacturing mustard powder. Colmans of Norwich have their own mustard factory and museum which is a big tourist attraction. A careful mix of light and dark mustard and turmeric powder is used to make the mustard called English Mustard

Brand Name : Colman's , Weikfield (Indian)
Capacity : 450 gms
Ingredients : Mustard powder, Wheat flour, turmeric powder.

How to make English Mustard ?

- ✓ The powder is mixed with tepid water to achieve a paste like consistency by stirring.
- ✓ A little milk may also added.
- ✓ A little vinegar may be added to bring the sharpness.
- ✓ Mustard must be made in small quantities – to be used the same day.

French Mustard

Mustard sauce has been made in the Dijon region of France for a long time. It was only when the dukes of the Dijon region decided to form a particular recipe for their sauce the things got standardized. It was again reviewed by Jean Naigeon in 1752 when he replaced the vinegar by the must from the most sourest of grapes called Verjus. Since then Moutarde de Dijon has become a name associated with quality and taste.
Since 1937 this label has guaranteed the type of production in which the mustard must contain at least 28% of dry extract and not more than 2%of husk. The seeds are cracked (outer husk), soaked in brandy vinegar, water and salt for several hours before being weighed, mixed with spices and ground. The

separation of the husk from the paste takes place in the centrifuge machine. Finally citric acid, turmeric and anti-oxidants are added.

Brand Name : Dijon
Capacity : 215 Gms
Ingredients : Mustard Powder, water, white wine, Salt and : : sugar, citric acid
Service : Served with grilled fish, meat, poultry

Points to be remembered while using Proprietary Sauces

The following Proprietary Sauces should always be available in the Coffee Shop / 24 hour Restaurant as well as In room Dining.

ITEM	BRAND
1. Tomato Ketchup	- Maggi Ketchup
2. Mustard	- English Colman's Mustard
	- Colman's of Norwich England
French	- French's
	- America's favorite Mustard
	- Reckitt & Colman Inc., USA
3. Worcestershire Sauce	- Lea & Perrins
4. Tabasco Pepper Sauce	- Mc Ilhenny Co.
5. HP	- HP Food Ltd., England
6. Sweet Chilli - Optional	- Sweeten Chilli
	- Great One Sauce
	- Product of Thailand
	- Tomato Chilli Maggi

All Sauce Bottles to be presented should be:
1. With Cap
2. More than half full
3. With neck and cap cleaned and wiped
4. Checked for date of expiry

Preparatory Sauce

We will discuss the prepararory sauce in details in the remaining sections of this unit.

4.8 THICKENING AGENTS IN SAUCE

As sauces should cling to the food, they must be thick. If they are not thick, they will drip down and would not add taste to the food. They should also be "consistent", that means it should not be lumply at one place and too thin on another. Such propories are given to the sauce by what we call thickening agents.

Following are some of the thickening agents

1. Starch can be found in corn starch, arrowroot and are important for human metabolism as they react with enzymes to produce sugar, which is a source of energy for body. Starches are made into paste with cold liquid and are then mixed with boiling stock to form required sauce. Starch gives viscosity and consistence to the sauce.

2. Egg yolk
   Egg yolk is first whipped (along with creame, if needed) with wire whisk. A cupful of the hot liquid is then added gradually . This mixture is then stirred into the sauce.
3. Cream can be added to thicken sauce using pan juice or ***au jus*** (**Au jus** is a French culinary term **meaning** "in the juice". It refers to meat dishes prepared or served together with a light gravy made from the juices given off by the meat as it is cooked.) for heavy cream.
4. Butter is used as thickening agent by adding it to the warm sauce and stirring it with whist gently for getting the required consistency.
   Egg yolk or butter or creame are used as thickening agents to warm sauces and soups .
5. Vegetable puree
   Puree is made by dicing cooked vegetables or pulping them and then passing it through sieve. Sometimes herbs are added to get variation of taste. The puree is mixed with sauces or gravies. Such sauces are preferred by health conscious clientele.
6. Blood of poultry/game/coral/lobster
   Blood is added to heavy creame and mixed with simmering sauce. It is used in such sauces as coc au Vin, Civet of game and Lobster a l' Americaine.
7. Buerre Manie
   We knead butter and flour in 2:1 proportion adding it a little at a time to simmering liquid and stir, forming smooth consistency. This is used mostly in fish sauces.
8. Roux
   We cook flour and butter in equal proportion to prepare roux. To avoid formation of lumps, flour is added slowly to melted butter. You get white or golden or brown roux by varying temperature and time of cooking. White roux is used in cream sauces, golden is used for all veloute sauces and brown roux is used in all brown sauces.

Check your progress - 4

1. Define sauce.
2. Why are thickening agents required for a sauce?
3. Which are the vegetarian thickening agents?
4. What are the various classes of sauces?

4.9 PREPARATION OF MOTHER SAUCE

There are six basic or mother sauces. The basic sauces have the following salient features:

1. They spawn multiple compound sauces
2. They are foundation for other culinary preparations like soups, casseroles etc
3. They have stable structure
4. They have thickened liquid base
5. They have long shelf life

The six basic or mother sauces are as follows:

1. Bechamel (White)
2. Veloute
3. Espagnole (Brown)
4. Tomato sauce
5. Mayonnaise sauce
6. Hollandaise sauce

Let us now see how they are prepared.

6. White Sauce : Bechamel Sauce.

White sauce or Bechamel sauce is more versatile for its nutral base.It is used to bind soufflés, croquettes , soups,egg dishes and gratins and to coat many foods.The texture should be smooth and rich and the consistency of double cream.The taste should be milky with no hint of raw flavour.

A plain Bechamel Sauce is made with flour .butter and milk in ratio of 1:1:20.Its flavoured with a clove studed onion**(cloute /pique)** which is infused in milk before making the sauce. Sometimes a amount of finely chopped onion,which is sweated in butter added to milk before adding the roux.

For thickening soup or sauce use only 15 grms. Of butter ,15 grms of flour with 225ml of milk and for a very thick Bechamel sauce ,use only 25 grms of butter ,25 grms of flour with 225 ml of milk.

Thickening milk with a white roux and simmering it with aromatics makes this white sauce. It should be creamy, smooth and lustrous.

Recipe

Butter 30 GM
Flour 30 GM
Milk 300 ml
Onion 1, studded with cloves.

Method :

1. Boil the milk.
2. Melt the butter in a heavy-bottomed pan and the flour and cook do not allow it to color.
3. Whisk in the warm milk and bring to the boil whisking constantly to avoid lumps.
4. Add the onion.
5. Reduce the heat and let it simmer for 10 mins, whisking constantly and scraping the base and sides to prevent the sides from sticking Strain.

Note: when cooking a large amount its advisable to cover and cook in a moderate oven (300 degree f) for 30 – 40 minutes, stirring from time to time. Nutmeg is often, classically added as a flavoring).If the sauce is not to be used immediately, DOT it with butter .This butter will melt over the surface and will prevent the sauce from skin formation .Alternatively, press directly the cling flim against the surface to prevent the skin formation

ANOTHER RECEIPE FOR BECHAMEL SAUCE

INGREDIENT	QUANTITY
Flour	250gm
Butter	250gm
Milk	4 litre
Onion studded with bayleaf and clove	125 gm
Nutmeg	Pinch
White pepper	Seasoning
Salt	Seasoning

METHOD

- **P**lace butter in a thick bottom pan on low heat. Add refined flour to it and cook till it
- Leavesthesideof the pan with out changing the colour. Cool the roux slightly.
- Boil the milk in a sauce pan with onion studded with bay leaf and clove .Pour the milk in the roux whisking constantly.
- Bring the sauce to a boil, lower the heat and simmer.
- Simmer the sauce for 20-30minutes.
- Season the sauce with salt pepper and nutmeg.
- Strain the sauce to remove unwanted lumps.
- Add melted butter on the surface to avoid formation of layer.

2. BLOND SAUCE : VELOUTE SAUCE

A Veloute sauce is often made from the liquid used in cooking the main ingredient , such as that used in poaching fish and chicken or for veal , as in a **Blanquette.A**dditional liquid is added to the blond roux at the beginning to make a very thin sauce.Simmering for 15 minutes to 1 hour thickens the sauce and intensifies the the flavour.The long slow process of cooking gives it a velvety texture and consistency----- hence the name **Veloute or Velvety.**Stir the sauce frequently to prevent scorching and skim from time to time.

Recipe

White Stock (Veal,chicken,fish) 350 ml.
Butter ……. 40grms.
Refined flour… 40 grms.
Double Cream / Cream Fraich … 20 ml.
Lime juice….. ½ tsp.
Seasonings….. to taste.

Method :

1. In a small sauce pan ,over a medium heat,bring the stock to boil.
2. Melt butter in a pan ,add flour and cook gently off and on the flame the blond roux to a golden straw colour by stirring contantly.Remove the pan fron the heat and cool slightly.
3. Whisk in the stock slowly and return the pan to the heat.Bring to boil slowly and stir continuously till the right consistency is achieved.
4. Simmer the sauce gently by stirring from time to time.
5. Add seasonings and finish with egg yolk and cream liaison.

ANOTHER RECEPE FOR VELOUTE SAUCE

INGREDIENTS	QUANTITY
Butter	400 gms
Flour	400 gms

Stock	5 litres
Mushroom trimming	125 gms

METHOD

- Take butter in a thick bottom pan met and add flour. Cook the flour till it gets a light golden colour.
- Add cold stock to the roux and stir to avoid lumps.
- Add mushroom trimmings to it
- Simmer the sauce for an hour.
- Strain the sauce and apply melted butter on the surface to void formation of ski.
- Store in a cool place covered.

3.BASIC BROWN SAUCE (SPANISH ORIGIN) : ESPAGNOLE

The most famous brown sauce ,Espagnole , is made with a rich brown stock and a gently cooked brown roux.Although rich sauce is robust , yet fine and well flavoured.It is time consuming and requires skills.A brown roux is tricky to make without scorching or separating.The sauce is intensified by adding fine original Spanish ham and tomato puree , which add to the glossy brown colour.Although it can be served by itself.It is also the base of many rich,dark French French sauce as 'Demi glaze',Sauce Robert and sauce Madira.
Now a days many chefs use a last moment thickner like arrowroot or potato starch,which produces a lighter sauce.

HOW TO MAKE ?

Mix 11/4kg of brown roux into 20 liters of brown stock,add mirepoix and tomato puree and then cook for 3-4 hours until it reduces by three.quarters,strain and use.

WHAT IS DEMI-GLAZE?

Cook equal quantities of espagnole and brown stock until reduce by half,finished with a little fortified wine ,skim and strain.

ALTERNATE RECEIPE OF ESPAGNOLE SAUCE

INGREDIENTS	QUANTITY
Mirepoix	
Onion	500 gms
Carrots	250 gms
Celery	250 gms
Butter	250 gms
Flour	250 gms
Brown stock	6 liters
Tomato puree	250 gms
Boquetgarni	
QUANTITY	1
Thyme	1
Parsley stem	6-8 sprig

METHOD

- Place the mirepoix in a sauce pan and sauté it until it turns brown.
- Add the flour and stir it to prepare the roux. Cook till the roux is brown.
- Add brown stock and tomato puree to it and stir constantly until the mixture comes to a boil.
- Lower the heat to simmer and remove the scum.
- Add the bouquet garni and let the sauce simmer for 2 hours.
- Strain the mixture through the sieve.
- Spread on of skin

4. TOMATO SAUCE

How to make?

Ingredients:

Salt Pork or Ham Shank	--- 6 oz
Mirepoix	--- 1 lb
Minced Garlic	--- 2 pc
Thyme	--- 2 pinches
Bay leaves	--- 2 medium sized
Parsley stems	--- 1 bunch
Sugar	--- 1 oz
Blond roux	--- 8 oz
Fresh ripe tomatoes (Peeled and chopped)	--- 8 lb
Canned tomato puree	--- 2.5 cans
White stock (veal or chicken)	--- 2 qt
Seasoning (salt pepper, Worcestershire)	-- to taste

Procedure

1. Melt pork. Cook to blond (golden) color
2. Sweat mirpoix and garlic and aromatics in pork fat
3. Add blond roux and dilute with white stock
4. Add tomato puree, tomato and sugar
5. Bring mixture to boil while stirring often
6. Cover and simmer in moderate 300F oven for 2 hours
7. Degrease and add seasoning
8. Pass through fine food mill then through chinois to attain smooth texture
9. Cool, label and refrigerate.

ALTERNATE RECIEPE OF TOMATO SAUCE

INGREDIENTS	QUANTITY
Salt pork	125gms
Onion	250gms
Carrots	250gms
Tomatoes	4 kg

Tomato puree	2 litre
Ham bones	500gms
Bouquet garni	
Garlic	2 cloves
Bay leaf	1
Thyme	1 gm
Rosemary	1 gm
Peppercorns	1 gm
Salt	To taste
Sugar	To taste

METHOD

- Add salt prok to a heavy sauce pot but do not brown it.
- Add diced onions and carrots and sauté until gets slightly softened, but do no brown
- Add tomatoes, its puree, bones and bouquet garni Bring to a boil. Lower the heat and let t simmer over very low heat for 1.5 to 2 hours. Keep simmering till a sauce consistency is obtained
- Remove the bones and bouquet garni
- Strain the sauce through a food mill
- Add salt and little sugar for taste

EMULSIFIED SAUCE

An **emulsion** is a colloidal dispersion of tiny droplets of one liquid suspended in another to form a homogeneous mixture.

The emulsified sauce includes ingredients most often egg or egg yolk and a fat such as butter or oil which normally do not form a stable suspension of mixture.By vigorous beating or shaking,the ingredients can be emulsified to form a smooth sauce in stable suspension.The most important emulsified sauce are Hollandaise,a warm sauce and Mauonnaise a cold sauce.Bearnaise is made in the same way as Hollandaise,but is flavoured with a reduction of viniger,shallots and tarragon which gives its characteristic sweet tangy flavour.Quality of all these sauces depend on using the best egg and butter or oil.Emulsified sauce is famous for being difficult because they separate or curdle so easily.

CLARIFYING BUTTER.

Clarified butter is a way of separating the milky fat solids (whey) from the pure butter fat. Once clarified, it can be served as a simple sauce, used for frying or to help to stabilize sauce like Hollandaise and Béarnaise.

Put the butter in a small pan and melt over a low heat; do not allow the butter to boil.

Remove the pan the heat and tilt the pan slightly. Using a flat spoon, skim off any n foam from the surface. Pour into a small bowl, leaving the milky solids behind. Cool ,if recipe directs.

6. HOLLANDAISE SAUCE : HOT EMULSIFIED SAUCE

Hollandaise and its variations are opaque, but the sauce should have a luster and not appear oily. They should have a smooth texture. A grainy texture indicates over cooking of the egg yolks. It should have light consistency and at times almost appears frothy.

1 table spoon of cold water,few milled pepper corn
Pinch of cayenne
Pinch of salt to season
2 egg yolks
5 ml Viniger / lemon juice
120 ml of clarified butter.

How to make?

1. Prepare a reduction of with vinegar / lemon juice and pepper corns in a pan,reduce to half.Swill the pan with cold water and allow to cool.
2. Place egg yolk and strained reduction into a mixing bowl and whisk to a ribbon stage over a bain marie.
3. Gradually whisk in the melted butter until the reduction is formed.
4. Add salt,caynne and lime juice.

ANOHER RECIEPE OF HOLANDAISE SAUCE

INGREDIENT	QUANTITY
Butter	1125 gm
Peppercorn	1 gm
Salt	1 gm
White vinegar	100 ml
Cold water	60 ml
Egg yolk	12 no
Lemon juice	30 ml
Cayenne pepper	To taste

METHOD

- Clarify about 900 gms of butter andkeep it warm but not hot
- Add peppercorns, salt and vinegar to a saucepan and place it o**n a** stove. Keep cooking until the mixture becomes dry.Remove from heat and add cold water to it
- Transfer the diluted, cooled reduction to a stainless steel bowl. Use a clean rubber spatula to ensure that all thecontents have been poured into the bowl.
- Add the egg yolk to the bowl and beat well
- Place the bowl over a double boiler and continueto beat the yolks till the mixture becomes thick and creamy.
- Remove the bowl from heat. Beat the clarified butter gradually with the help of a ladle. Add a few drops of butter at first. Lemon juice can be added to the sauce if it becomes too thick to be beaten
- Salt and cayenne can be for seasoning.
- Strain through cheese cloth and keep it warm.

- If the sauce curdles add lemon juice and whisk.

MAYONNAISE SAUCE : COLD EMULSIFICATION

This delicious sauce is used in salads,sandwiches and as apart of other sauces.It can be varied by using different oils,herbs and other flavourings.Mayonnaise can also be made in a blender,food processer or with an electric mixer.Make sauce that all the ingredients are in room temperature.If making by hand,set the bowl on a towel to stop it sliding around.

Remember, mayonnaise is made with raw egg yolk which can harbour 'Salmonella' bacteria. Pregnant women, children and the elderly should avoid under cooked or raw eggs.

MAYONNAISE SAUCE

This is a cold, emulsified sauce, used extensively in the Garde Manger.

Egg yolks 2
Oil (Olive oil,vegetable oil
Or half of each) 360 ml
Salt
Pepper
Mustard (Dijon)
Sugar
White vinegar /Lemon juice 15 ml

- Bring all the ingredients to room temp.
- Combine the yolks and seasoning and beat a little.
- Add the oil very slowly and keep beating till and emulsion is formed.
- Add the vinegar/lime juice and check seasoning.

Points to remembered

Faults :

Unstable emulsion caused due to:

A .When the ingredients have been at too low a temperature,thus preventing the emulsifying agents from coating the oil successfully.

B .By using stale egg yolks which consequently provide insufficient agent.

C. By inadequate whisking when adding oil to the egg yolks,thus preventing even distribution of oil into egg.

D. By adding oil too quickly in the initial stages of preparations,thus prevent a thorough mixing of yolks and oil resulting in the sauce separations.

E. By using incorrect formula balance.

How to correct a curdled Mayonnaise Sauce?

Mix the unstable emulsion on to a fresh egg yolk or on to a few drops of boiling water.Use a clean bowl and proceed as for making Mayonnaise.

ALTERNATE RECIEPE OF MAYONNAISE

INGREDIENTS	QUANTITY
Egg yolk	8
Vinegar	30ml
Salt	10 gm
Dry mustard	10 gm

Cayenne pepper	Pinch
Salad oil	1.7 litre
Vinegar	60 ml
Lemon juice	50-60 ml

METHOD

Place the egg yolk, vinegar and seasoning in a clean bowl and whisk well
While whisking add oil gradually until the oil gets absorbed in the mixture
Add lemon juice and warm water to the sauce

The following points must be remembered while preparing mayonnaise

- Mayonnaise should not be exposed to low temperature after its preparation.
- The oil should be added slowly. Quickly adding it may spoil the sauce.
- Too cold or thickened oil should not be used.
- The oil added should be in proportion to the egg yolks
- Hot water, which acts as a stabilizer, can be used per requirement.
- The sauces should be placed in a suitable container, covered with a lid and stored in a cool place.

CHECK YOUR PROGRESS

1. How many types of mother sauces are there?
2. How do you prepare Tomato Sauce?
3. How can you rectify the unstable emulsion in making Mayonnaise sauce?

4.10 UNDERSTANDING THE DERIVATIVES OF SAUCE

Sr. no	**Mother sauce**	**Derivative**
1.	Bechamel	Mornay Cream Soubise Cardinal Parsley Musturd Anchovy Onion sauce
2	Veloute	Allemande Ivory Shrimp Normande Joinvillie Vin blanc Nantua Diplomate

		Ravigote
	Espagnole	Demeglaze Bercy Chasseur Bordelaise Chaudfroid Devil Madeira Piquant
4	Hollandaise	Mousseline Maltaise Noisette Foyot Choron Bearnaise Mustare Rachel Grimrod
5	Tomato sauce	Barbeque Italienne Milanaise Bretonne Provecal Portugaise
6	Mayonnaise	Cocktail Tartare

DERIVATIVES OF BÉCHAMEL SAUCE

Cream sauce

Chopped onions are reduced with white wine and then cream is reduced in the same pan. Now some béchamel sauce is added & whisked in. More cream is added till correct consistency is obtained and the sauce is then strained.

Sauce Mornay

Grated Cheddar cheese is added to cream sauce and it is strained.

Sauce Fine herbs

To cream sauce, some chopped tarragon, parsley and chervil are added. In place of chervil we often use thyme.

Chilly mornay

Some bell peppers are lightly sautéed in olive oil, & paprika powder is added to it. Mornay sauce is poured over this till the flavor is obtained & it is then strained out.

Sauce Nantua

To cream sauce, add very fine crayfish butter and small cooked crayfish tails.

DERIVATIVES OF VELOUTE SAUCE

Sauce Allemande

Quiet simply, this is a veloute thickened with egg yolks and flavored with mushroom liquor, lemon juice, pepper and nutmeg. (This sauce is also known as sauce Parisienne)

Sauce Supreme

This is a chicken veloute enriched with cream. It should be very white in color and delicate in flavor.

Sauce Ivore

To one-liter sauce supreme, add three-tbs. melted light colored meat glaze, just sufficient to give the acquired ivory tint to the sauce. Suitable for serving with poultry.

Sauce Normande

To fish veloute-add mushroom liquor and cooking liquor from mussels and fish stock, all in equal proportions, a few drops of lemon juice and a thickening of egg yolks with cream. Reduce this to 1/3 of its volume. Pass through a fine strainer and finish with some more cream butter. This can be used for a large numbers. of fish dishes.

Sauce Joinville

Prepare Sauce Normande and finish with equal parts of crayfish butter and shrimp butter instead of cream and butter.

Points to be remembered

When ever the above sauces are served with chicken,veal,fish or shell fishes,they are seasoned to taste with salt and pepper and adjusted for consistency to suit the requirements.Again the above sauces are used for a glazed dish,egg yolk or a sabayon should be added to the sauce just prior to glazing.Once egg yolk has been added do not reboil,other wise the sauce will separate.

SABAYON

Mix yolk of egg with a few drops of water and whisk over bain-mari to ribbon stage.used to enrich sauce and assist when a glazed appearance is required.

DERIVATIVES OF BROWN SAUCE

Sauce Chasseur

Melt. butter in a small pan, add. chopped shallots and sliced mushrooms and sauté. Add white wine, reduced by ½, and then add equal parts of tomato sauce and sauce demi-glaze. Add meat glaze, simmer gently and finish with chopped parsley (In some methods of preparing Sauce Chasseur some brandy is also added)

Sauce Bordelaise

Reduce red wine in a small pan with. Finely chopped shallots, a little pepper, bay leaf and a sprig of thyme to ¾ .s .Add Sauce Espagnole and allow it to simmer gently, skimming as necessary. Pass through a fine strainer and finish with. Melted meat glaze, the juice of ¼ lemon and 50 gm. Bone marrow cut into small slices or dices and poached. This sauce is especially suitable for serving with grilled red meats.

(Originally this sauce was made with white wine but nowadays-red wine is always used)

Sauce Bourguignonne

Reduce red wine in a pan with sliced shallots, a few parsley stalks, a bay leaf, small sprig of thyme and mushroom trimming ½. . Pass through a fine strainer (u may thicken by adding beurre manie). Finish at the last moment with frozen butter and a little cayenne. This sauce is especially suitable for serving with egg and dishes designated a' la bourguignonne.

Sauce Diable

Place white wine in a pan. Add chopped shallots and reduce by 2/3. Add sauce demi glaze and allow to simmer slightly for a few minutes then season the sauce strongly with cayenne pepper. This sauce is especially suitable for serving with grilled chicken.

NOTE; Vinegar may be used instead of wine and chopped fine herbs and may be included in the reduction.

Sauce Piquante

Place white wine and the same amt of vinegar in a pan with chopped shallot, reduce by ½., Add sauce espagnole, bring to the boil and simmer gently, skimming as necessary for 10 min. Remove from the heat and finish with 2 tbsp. of chopped gherkins, tarragon, chervil and parsley. This sauce is usually served with boiled, roasted or grilled pork.

Sauce Poivrade

Heat oil in a pan, add a mirepoix comprising of. Carrots, onion, little parsley stalks, a pinch of thyme and a crushed bay leaf and cook until lightly colored. Moisten with vinegar, & marinade and reduce by 2/3. Add. sauce espagnole and allow to simmer gently for 45 min. A little before passing the sauce add crushed peppercorns and pass through a sieve then add some of the marinade again. Bring to the boil, skim and carefully simmer for approx. 35 min. so as to reduce the sauce to required quantity. Pass and finish with. butter.

Sauce Madeira

Reduce sauce demi glaze until slightly thickened. Remove from the heat and add Madeira wine Pass through a fine strainer and do not re boil.

Sauce au Porto

This is prepared in the same way as Madeira replacing the Madeira wines with Port wine.

Sauce Robert

Heat butter in a pan, add finely chopped onion and cook without coloring.
Moisten with white wine and reduce by 2/3. Add sauce demi glaze and simmer gently for 10-min. Pass the sauce through a fine strainer and finish away from the heat with a pinch of sugar and some English mustard diluted with a little water.
This sauce is usually served to accompany grilled pork.

Sauce Vin rouge

Heat butter, add finely cut mirepoix and cook to a light brown color; moisten with good quality red wine and reduce by ½. Add some crushed garlic and espagnole; skim & simmer carefully for 12-15 mins. Pass through a fine strainer and finish with butter, a little anchovy essence and a little cayenne pepper. This sauce is especially suitable for serving with fish.

Sauce Matelote

Place red wine court – bouillon in a pan with mushroom trimmings. Reduce by two-thirds and then add Espagnole. Simmer gently for a few min and pass through a fine strainer. Finish the sauce with of and lightly season with cayenne pepper.

DERIVATIVES OF HOLLANDAISE SAUCE

Sauce Choron

Prepare a Sauce Béarnaise, omitting the final addition of tarragon and chervil and keeping it fairly thick, add upped a quarter of its volume of tomato puree which has been well concentrated or reduced in order that the addition will not alter the consistency of the sauce.

Sauce Foyot

Prepare a Sauce Béarnaise, keeping it fairly thick and finish with melted meat glaze added little at a time.

Sauce Maltaise

Prepare a Sauce Hollandaise and at the last moment add the juice of 2 oranges (reduced) and a good pinch of grated zest. Goes well with asparagus.

Sauce Palois
Prepare a Béarnaise but while doing this replace the principle flavoring of tarragon with the same quantity of mint in the reduction of white wine and vinegar and replace the chopped tarragon with chopped mint at the final stage.
Sauce Mousseline(Chantilly)
Prepare Sauce Hollandaise and at the last moment carefully mix in. stiffly whipped cream.
DERIVATIVES OF MAYONNAISE SAUCE.
Sauce Tartare
To mayonnaise sauce add chopped gherkins, capers, shallots, parsley, chives.
Sauce Verte
Blanch rapidly for five minutes spinach and watercress & a mixture of parsley, tarragon and chervil drain well. Refresh quickly and squeeze out all the water. Pound the leaves then squeeze them firmly in a clean cloth so as to obtain a thick herb juice. Add this to well seasoned mayonnaise.
Sauce Mousquetaire
To mayonnaise add finely chopped shallots which have been cooked and completely reduced with white wine, some melted meat glaze and chopped chives.
Season the sauce with a touch of cayenne or milled pepper.
Sauce Remoulade
To mayonnaise add and mix in Mustard, chopped gherkins, chopped capers, parsley tarragon and chervil and some anchovy essence.

Sauce Casanova
Add chopped truffle and shallots,sieved hardboiled egg to Mayonnaise.
Sauce Gribiche
Mix together cooked yolks of egg with mustard,salt and pepper and gradually add oil and vinegar as for Mayonnaise.Garnish with chopped Capers,gherkins and fine herbs along with the julienne of hard boiled egg white.
HARD BUTTER SAUCE : BEURRE COMPOSE
This preparations are used to accompany a variety of grilled meat or fish dishes.Also it adds interest and flavor to various products .They are easily prepared in advance and stored refrigerated in readiness for use.
Cream butter until soft, combine with flavourings and seasonings to taste.Roll in dampened grease proof paper to cylindrical shape,approximately 2 ½ cm wide.Store refrigerated but not frozen.
It may be utilized in the following way…

1. add to sauce to enhance flavour.
2. in the preparation of a culinary product e.g. snails in garlic butter.
3. place on a hot food for service e.g. grilled steak.
4. place in a sauce boat of iced water to keep the butter solid in hot atmosphere.

EXAMPLES OF COMPOUND / HARD BUTTER SAUCE
Anchovy Butter : add anchovy essence /paste / pounded to butter.
Garlic Butter : chopped garlic ,parsley,pinch of pepper combined with butter.
Basil Butter : add a fine puree of fresh basil leaves and a little lemon juice with butter.
Colbert Butter : mix chopped tarragon and meat glaze in to Maiter d'hotel butter.
Maiter d'hotel Butter : add chopped parsley,seasonings and lime juice to butter.

Ravigote Butter : pound blanched herbs and shallots,pass through a sieve and add to soften butter.
Bercy Butter : reduce chopped shallots in wine,add butter,bone marrow,chopped parsley and lemon juice.
Cray fish Butter : pulverize crayfish dedris,add butter and pass through a sieve.

Red wine Butter : reduce shallots in red wine and add to butter with seasonings,lemon juice and chopped parsley.
Nutty Butter : add finely chopped peanuts,the slices of butter may be dipped in chopped nuts.

CHECK YOUR PROGRESS

1. List at least 5 derivatives of MAYONNAISE SAUCE.
2. How do you prepare Casanova Sauce?
3. What is a hard butter sauce?

4.11 PROPERTIES OF SAUCE

The functionof the Sauce in Culinary work

- Sometimes sauces are used to add a **contrast in taste** to another food. Apple sauce with fresh roast pork serves the same purpose. Broadly speaking any condiment or mixture of food, which serves to contrast with or compliment another food, can be termed a sauce. In this broad sense a peanut butter and jelly mixture would be a sauce to a piece of bread if they were served together.
- Some sauces are used to add **sharpness** or **tanginess** to a bland food. A remoulade sauce served with shrimp is an example of a piquant sauce.
- Sauces may add to the **appearance** of food, sometimes as a coating which is poured or brushed over the food to give a pleasing appearance to an otherwise uninteresting item. the *chaud-froid sauce* made with a cream or mayonnaise and gelatin is used to coat various food items.
- Sauces such as *barbeque sauce* are used to **modify the original flavor** of a food, blending the sauce flavor with the flavor of the food.
- Some sauces are used to **disguise or mask** the original flavor of the food. As the French use the work `**mask'** in regard to sauces, masking a food with a jelly or sauce is to completely cover it physically hiding its appearance. Masking does not change the true flavor of the food.

- Sauces should never be used to change the flavor of a food material, only to enhance or to compliment the flavor of the food.
- **Salad dressings** such as *French dressing* and *mayonnaise* could also in this sense be considered sauces. However, sauces are usually considered those mixtures served with meats, entrees, desserts and other major foods as a compliment or contrast to their flavor.

4.12 PREPARATION OF SOME OTHER SAUCE

BEARNAISE SAUCE :NOT A MOTHER SAUCE

This sauce is made in much the same way as Hollandaise sauce, but a pungent reduction is made before adding the egg yolks and butter. The reduction should be reduced to about 1 table spoon.

BÉARNAISE SAUCE

(This is not a mother sauce)

A.

Wine vinegar	120 ml
White wine	120 ml
Shallots, finely chopped	6 med
Tarragon finely chopped	1 tbs
Parsley finely chopped	1 tbs
Chervil finely chopped	3 tbs
Crushed pepper	1 tbs

Seasonings

B

Egg yolks	6-8 nos.
Clarified butter	500 gm

· Make a reduction of all ings n A till 2/3.
· Separate egg yolks, add reduction and a little water and beat slightly to a froth.
· Put on a double boiler and beat till it thickens, over a low heat.
· Remove from heat and beat the clarified butter into it very gradually till it thickens.
· Season.

Points to be remembered

Faults :

1. Scrambled appearance of sauce due to coagulation ,shrinking and hardening of egg protein at around 55^0C (158^0F) ,so care must be taken to :
    a. ensure that egg yolk do not become too hot when whisking to ribbon stage over the double boiler.
    b. Prevent the melted butter over heating before adding to the egg yolk.
    c. Prevent the sauce from over heating prior to service.
2. Curdled sauce which may be the the result of the following reasons :
    a. insufficient agitation during mixing
    b. too much mechanical agitation which breaks down the the protective layer of emulsifying agent.
    c. Adding melted butter too quickly to the egg mixture.
    d. Using in correct formula.
    e. Using egg yolks which lack sufficient emulsifying agent e.g. stale egg yolks.

To over come the above mentioned points,care must be taken to :

a. ensure that the melted butter is not added too quickly to the to the egg yolks.
b. Whisking briskly when adding the melted butter.
c. Prepare sauce just before the service.
d. Ensure fresh eggs are used.

Rectifications :

a. place a small amount of boiling water into a clean bowl.Gradually whisk the curdled mixture on to the water.
b. Place fresh egg yolks into a clean bowl.Gradually whisk in the curdled mixture on to the yolk ,whisk gently over a bain-marie.

HOT BUTTER SAUCE : BEURRE CHAUD

Hot butter sauces are often used with vegetables, fish, meat offals and poultry dishes. They can be served to complete a dish or as an accompaniment e.g. Poisson Meuniere,beurre meuniere to complete;beurre fondue to accompany asparagus etc.

EXAMPLES OF HOT BUTTER SAUCE

Beurre Noisette:

Heat butter until brown and pour over the food on the dish,if desired a little lemon juice may be added.This butter is frequently used in conjuction with jus lie for shallow fried food.

Beurre Noire:

Heat butter until it begins colour brown,add a few drops of vinegar and pour over the food.Capers and chopped parsley may be added at the last moment.

Beurre Blanc:
Cook chopped shallots in a little water, gradually adding the juice of lemon as it evaporates. Whisk butter in small pieces at a time, keeping the pan in a bain-marie of water until the lemon sauce become white and frothy. Serve at once and do not allow to become too warm.
Beurre Rouge: Make as Beurre Blanc by using red wine.
Beurre Fondue: Heat butter until warm and just melted, add lemon juice and served immediately.
Beurre Meuniere: As for Beurre Noisette garnish with chopped parsley.
Sauce au Beurre : Add flour to melted butter then boiling salted water to make a smooth sauce.add a liaison of egg yolk,cream and lemon juice,allow to thicken and finish with plenty of butter added in pieces at the last moment.Served with poached fish,asparaguds etc.

OTHER SAUCES : NONDERIVATIVE SAUCES AND GRAVIES

Except the above mentioned sauces there are many sauces which are prepared independently. They are as follows.

- Jus lie --------- Thickened gravy.
- Sauce Kari------- Curry sauce.
- Sauce Portugaise------ Sauce Portuguese.
- Sauce Brigade------- Orange flavoured sauce.
- Sauce Homard------- Lobster sauce.
- Sauce Bologonaise------ Sauvory meat sauce.
- Sauce Pommes------- Apple sauce.
- Sauce Pain---------- Bread sauce.
- Sauce Menthe------- Mint sauce.

4.13 MAKING A GOOD SAUCE

General faults in sauce production

1. **Lumpiness :** This may be caused by the following ……
    - Roux is too dry when liquid is added.
    - Adding liquid too quickly and not stirring continuously.
    - Incorrect temperature of roux and liquid.One should be hot and other should be cold.
    - Formation of the skin when the sauce comes in contact with air and becomes dry.This can be prevented by putting a film of melted butter on the surface of the sauce or by using a greased paper.
    - By allowing sauce to congeal on the the sides of the cooking vessel which later could be stirred into sauce.
2. **Poor gloss :** This is caused by in sufficient cooking of the sauce or using a sauce which has not been passed ,tammied or liquidized. High gloss is achieved by preparing the sauce correctly and aidded by the addition of butter just prior to service,called **'mounting with butter'** or **'monter au beurre'**
3. **Incorrect consistency :** This is the result of in correct formula balance.Over and under cooking is ultimately lead to a incorrect conistency.
4. **Greasiness :** Too much fat in roux or failure to skim off surface grease as it rises.The use of greasy stock may cause this fault.
5. **Poor colour :** Incorrect cooking of the roux in the early stage ,usining dirty cooking vessel or utensils may cause poor colour.
6. **Raw starch flavour :** This causes due to the insufficient cooking of starch.Starch needs to reach to boiling point and simmered it for a further period to avoid for a raw starch flavour.

7. **Bitterness** : This is caused by over browning or burning of the roux.

4.14 EMERGING TRENDS IN SAUCE

We have been discussing the traditional sauces so far. We will now discuss the contemporary sauces. We will then discuss the difference between ***gravy*** and ***sauce***.

Contemporary Sauces

The broad category of contemporary sauces includes beurre blanc, coulis, compound butters and a variety of miscellaneous sauces, such as relishes, salsas and compotes.

The primary factors distinguishing contemporary sauces from the grand sauces are the following -

- They usually take less time to prepare.
- They are more likely to be specifically tailored to be a given food or technique.
- They have a lighter color, texture and flavor than some of the grand sauces.
- They are more likely to be thickened and finished using emulsions, modified starches or reduction and less likely to contain roux.

Some of the popular contemporary sauces are discussed bellow.

1. **ROASTED TOMATO COULIS**

Roma tomatoes peeled and deseeded	02 no.
Salt and white pepper	to taste
Extra virgin olive oil	2 fld. Ounce

Preparations:

- Place the tomatoes on a grill and roast until the skin is charred.
- Peel and remove the seeds from all the tomatoes.
- Place the tomatoes, extra virgin olive oil , salt and white pepper mixture in a food processor and make puree to a fine texture

2. **TOMATILLO SALSA VERDE**

To cook the tomatillos, you can either roast them in the oven, or boil them. Roasting will deliver more flavor; boiling may be faster and use less energy. Either way works, though boiling is a more common way to cook the tomatillos.

Ingredients

Tomatillos	200 grms.
Chopped white onion	50 grms.
Cilantro leaves	50 grms.
Fresh lime juice	1 tblsp.
Sugar	to taste
Jalapeño peppers	02 nos.
OR	
Serrano peppers, (stemmed, seeded and chopped)	02 nos.
Salt	to taste

PREPARATIONS:

1. Remove papery husks from tomatillos and rinse well.
2. **Roasting method** Cut in half and place cut side down on a foil-lined baking sheet. Place under a broiler for about 5-7 minutes to lightly blacken the skin.
3. **Boiling method** Place tomatillos in a saucepan, cover with water. Bring to a boil and simmer for 5 minutes. Remove tomatillos with a slotted spoon.
4. Place tomatillos, lime juice, onions, cilantro, chili peppers, sugar in a food processor (or blender) and pulse until all ingredients are finely chopped and mixed. Season to taste with salt. Cool in refrigerator.
5. Serve with chips or as a salsa accompaniment to Mexican dishes.

3. RED PEPPER AND CORN RELISH

Ingredients

Red bell pepper	1 large
Cider vinegar	1/4th cup
Real maple syrup	3 tablespoons
Hot pepper sauce	2 1/2 teaspoons
Ground turmeric	2 teaspoons
Salt	1 teaspoon
Vegetable oil	1/3 cup
Corn kernels	03 pkts
Chopped green onions	1/2 cup

Preparations:

1. Roast the red pepper over a gas flame or under the broiler until blackened on all sides. Remove from heat and seal in a paper bag and let stand for 10 minutes. Peel, seed and chop.
2. In a large bowl combine the vinegar, maple syrup, hot pepper sauce, ground tumeric and salt. Gradually whisk in the oil. Add the chopped red pepper, thawed corn and green onions. Toss to coat. Cover a refrigerate overnight, stirring occasionally. Can be made up to 3 days ahead of time. Let relish stand at room temperature for 30 minutes before serving.

4. ROSEMARY OIL

Ingredients

Rosemary fresh	06 sprigs.
Extra virgin olive oil	570 ml.

Preparations:

1. Put the rosemary into a clean dry sterilized bottle
2. Pour the oil over and cover tightly.
3. Leave to stand in a sunny place for 2 to 4 weeks.
4. Strain through a thick muslin cloth.
5. Store in an air tight sterilized bottle.

5. BASIL OIL

Fresh basil leaves	1 1/2 cups
Olive or vegetable oil (see notes)	1 cup

1. Rinse and drain basil leaves. Pat leaves dry with a towel. In a blender or food processor, combine basil leaves and olive or vegetable oil (see notes). Whirl just until leaves are finely chopped (do not purée).
2. Pour mixture into a 1- to 1 1/2-quart pan over medium heat. Stir occasionally until oil bubbles around pan sides and reaches 165° on a thermometer, 3 to 4 minutes. Remove from heat and let stand until cool, about 1 hour.

3. Line a fine wire strainer with two layers of cheesecloth and set over a small bowl. Pour oil mixture into strainer. After oil passes through, gently press basil to release remaining oil. Discard basil. Serve oil or cover airtight and store in the refrigerator up to 3 months. The olive oil may solidify slightly when chilled, but it will quickly liquefy when it comes back to room temperature.
Note: Drizzle this aromatic oil over sliced tomatoes, fresh mozzarella cheese, green beans, potatoes, bread, green salads, and grilled or poached chicken or fish. Choose a mild-flavored oil so it doesn't overwhelm the basil; the oil should take on the flavor and fragrance of the basil you use. For more intense flavor, after step 2, cover and chill oil up to 1 day. Strain (if solidified, let come to room temperature first).

6. **CHIMICHURRI**

Chimichurri is one of most delicious and versatile sauces around. It's traditionally served with grilled steak, and is an essential part of the Argentinian parilla, but it goes great with chicken and fish too. Chimichurri works well as a marinade, and is also delicious on vegetables. It is always best with the grilled chorizo sausages (always the first course of a parilla).
Some people prefer more garlic, some prefer only parsley, some add fresh tomatoes - experiment to come up with your own signature chimichurri.

Ingredients

Fresh parsley and/or cilantro	2 cups
Fresh oregano leaves (optional)	1/4 cup
Garlic	3-6 cloves
Chopped onion	2 tablespoons
Olive oil	1/2 cup
Red wine vinegar (optional)	2 tablespoons
Lime juice (optional)	1 tablespoon
Kosher salt and red pepper flakes	to taste

Preparation:

1. Pulse the garlic and onion in the food processor until finely chopped.
2. Add the parsley and/or cilantro, and oregano if using, and pulse briefly, until finely chopped.
3. Transfer the mixture to a separate bowl. Add the olive oil, lime juice, and vinegar, and stir. (Adding the liquids outside of the blender gives the chimichurri the correct texture. You don't want the herbs to be completely puréed, just finely chopped).
4. Season with salt and red pepper flakes to taste.
5. Store in the refrigerator until ready to serve.

7. **RED ONION MARMALADE**

Ingredients

Red Onion	2 kgs.
Garlic	04 cloves
Butter	150 grms.
Fresh thyme	01 tbsp.
Chilli flakes (optional)	pinch
Red wines	200ml
Sherry viniger	350 ml.
Port wine	200ml.

Preparations:

1. Halve and thinly slice the onions, then thinly slice the garlic. Melt the butter with the oil in a large, heavy-based saucepan over a high heat. Tip in the onions and garlic and give them a good stir so they are glossed with butter. Sprinkle over the sugar, thyme leaves, chilli flakes if using and some salt and pepper. Give everything another really good stir and reduce the heat slightly.

Cook uncovered for 40-50 minutes, stirring occasionally. The onions are ready when all their juices have evaporated, they're really soft and sticky and smell of sugar caramelising. They should be so soft that they break when pressed against the side of the pan with a wooden spoon. Slow cooking is the secret of really soft and sticky onions, so don't rush this part.

2. Pour in the wine, vinegar and port and simmer everything, still uncovered, over a high heat for 25-30 minutes, stirring every so often until the onions are a deep mahogany colour and the liquid has reduced by about two-thirds. It's done when drawing a spoon across the bottom of the pan clears a path that fills rapidly with syrupy juice. Leave the onions to cool in the pan, then scoop into sterilised jars and seal. Can be eaten straight away, but keeps in the fridge for up to 3 months.

8. HARISSA

Harissa is a hot chili paste that is commonly found in North African cooking, mainly Moroccan, Algerian, and Tunisian cuisine. It is added to couscous, soups, pastas and other recipes. It can also be purchased in Middle Eastern stores in a can.For a very spicy harissa: use a blend of cayenne, chile de arbol, or cayenne with a milder chile like ancho chilies

For a medium spiciness: use a blend of New Mexico chilies with guajillo chilies

Ingredients

Dried red chili peppers	10-12
Garlic, minced	3 cloves
Salt	1/2 teaspoon
Olive oil	2 tablespoons
Ground coriander	1 teaspoon
Ground caraway seeds	1 teaspoon
Cumin	1/2 teaspoon

Preparation:

1. Soak the dried chilies in hot water for 30 minutes. Drain. Remove stems and seeds.
2. In a food processor combine chili peppers, garlic, salt, and olive oil. Blend.
3. Add remaining spices and blend to form a smooth paste.
4. Store in airtight container. Drizzle a small amount of olive oil on top to keep fresh. Will keep for a month in the refrigerator.

9. PESTO

Pesto, which originated in Genoa, Italy, comes from the Italian word pestare that means to pound or to bruise. The traditional way of making pesto and still the best way is with mortar and pestle. Doesn't mortar and pestle just sound bruising? You can use your blender or food processor if in a hurry or if you're making large quantities, but they go far beyond bruising, they puree those poor tender basil leaves. Typically, pesto is made with fresh basil, garlic, pine nuts, parmesan cheese, olive oil, salt and pepper, but why not experiment with various herbs and nuts and cheeses to come up with your own special pesto.

Ingredients

Garlic	3 cloves
Fresh basil leaves	2 cups
Pine nuts (pignolia)	3 tablespoons
Salt and pepper	1 dash
Extra virgin olive oil	1/2 cup
Parmesan cheese grated	1/2 cup

1. The traditional way of making pesto is with a mortar and pestle. Start by adding basil, garlic, salt, and pine nuts to the mortar and grinding them to a paste. Pound in the cheese. Finally whisk in the oil until you have the desired consistency.

2. Add the garlic to the food processor and mince. Next, add the basil leaves, pine nuts, and a dash of salt and pepper to the bowl of the processor. While the processor is running, slowly drizzle in olive oil through the feed tube until all the ingredients are pureed.
3. You may need to stop the processor at this point and scrape down the sides with a rubber spatula to get every mixed together. Now add Parmesan cheese and mix it into the rest of the mixture. If the pesto is too thick, add a tablespoon of water.
4. Cover and refrigerate until you are ready to use it. This should keep for 2 - 3 days in the fridge but freezes well if you want to keep it longer.
5. Making pesto is not a lot of work and the intense flavor and enjoyment of making your own may keep you from buying supermarket pesto in a jar for a while.

10. Spanish Caramelized Peppers Recipe - Pimientos Caramelizados

Sweet red peppers are finely chopped, then simmered in a mixture of vinegar, sugar and water until reduced to a syrup. Caramelized peppers have a unique sweet and sour flavor, that can be used in tapas or desserts. Once cooled, the peppers can be spread on salads, toast or soft cheese.

11. BALSAMIC REDUCTION

1. Pour the balsamic vinegar into the pan. Use enough so that you allow for it to reduce by half--I like to reduce a whole liter of vinegar and keep it on hand.
2. Heat the pan to high.
3. Whisk briskly, even prior to boiling. Once it starts boiling, keep whisking constantly to prevent burning.
4. The vinegar naturally sweetens when reduced, but if you like a very sweet reduction, sprinkle in a tablespoon of sugar.
5. Reduce by half, or until the vinegar takes on a syrupy quality. Allow to cool.

12**. POMEGRANATE MOLASSES**

Ingredients

Pomegranate juice	4 cups
Sugar	1/2 cup
Lemon juice	1/4 cup

Preparations:
In a large, uncovered saucepan, heat pomegranate juice, sugar, and lemon juice on medium high until the sugar has dissolved and the juice simmers. Reduce heat just enough to maintain a simmer. Simmer for about an hour, or until the juice has a syrupy consistency, and has reduced to 1 to 1 1/4 cups. Pour out into a jar. Let cool. Store chilled in the refrigerator.
If you want your pomegranate molasses to be sweeter, add more sugar to taste, while you are cooking it.

13**.BEURRE BLANC**

Beurre blanc is a simple butter-based emulsified sauce that's great with fish or seafood.Beurre blanc is a nice sauce to have in your repertoire because you can whip up a batch on the spot (all you really need is wine and butter), making it ideal for emergencies.

Good wines for the reduction (or au sec, meaning "nearly dry") include Chablis, Sauvignon Blanc or Chardonnay, but any drinkable dry white will do. For a deliciously luxurious beurre blanc, try making it with leftover Champagne.

Ingredients:

Dry white wine	1 cup
White wine vinegar	½ cup
Finely chopped shallot	1 Tbsp
Butter, cold	1 lb unsalted
Kosher salt	to taste

Preparation:

1. Heat wine, vinegar and shallots in a saucepan until the liquid boils, then lower the heat a bit and continue simmering until the liquid has reduced down to about 2 tablespoons. This should take about 10 minutes.
2. While the liquid reduces you can cut the butter into medium (½-inch) cubes, but either leave this until the reduction is nearly finished or return the butter cubes to the refrigerator to keep them cold while the liquid finishes reducing.
3. Once the wine-vinegar mixture has reduced to 2 tablespoons, reduce the heat to low and start adding the cubes of butter, one or two at a time, and whisk rapidly with a wire whisk.
4. As the butter melts and incorporates, add more butter and keep whisking. Continue until you only have 2-3 cubes remaining. Remove from heat while whisking in the last few cubes, and whisk for a moment or two more. The finished sauce should be thick and smooth.
5. Season to taste with Kosher salt. Traditionally the shallots would be strained out before serving, but doing so is optional. Serve right away.

SAUCE AND GRAVY

Sauce is a French word taken from the Latin Salus, meaning salt. No surprise given that salt is used to enhance the flavour of food. There are hundreds of sauces that fall under five main categories. They are béchamel (milk based) example Alfredo sauce, espagnole (brown stock based) example Mushroom sauce, veloute (white stock based) example Lyonnaise sauce, tomato (tomato based) example Marinara sauce and emulsified (hollandaise and mayonnaise) example Béarnaise sauce, tartar sauce. As you can see each of these sauce categories begin with a fundamental base. An all inclusive quality cook book will provide you with the ingredients and methods for which to prepare these sauces.

Behind sauce is a holdover from sauteing -- deglazing. Deglaze is a single word that means to loosen the cooked-on drippings in your roasting pan by adding liquid and boiling it on the highest heat. When meats cook, their drippings leave a "glaze," which appears as stray bits of food that stick to the bottom of the roasting pan. You might think they're burnt, but these particles are the hidden flavor in many sauces -- that is, if you can deglaze (or if you prefer, unglaze) the pan.

You'll be deglazing in the same pan the meat roasted in, so think ahead. Don't roast in glass. Instead use stainless steel, enamel-covered cast iron, graniteware, or other alloyed materials which, after time in the oven can endure the direct heat from a burner.

To make the sauce: Pour anything that moves (liquids and juices) out of the roasting pan into a measuring cup, but don't scrape the bottom of the pan. Refrigerate the cup and put the roasting pan on a burner. In about 5 minutes, take the cup out of the refrigerator and spoon off as much fat as you can -- it's OK if you've still got a little bit. Pour whatever juices remain in the cup into the roasting pan. The pan

will hold very little contents at this time. Turn the burner to high. When you see bubbling, add some stock, water, or red or white wine (from 1/2 to 1 cup). Enjoy the show of smoke, a sign that things are going nicely. Use a wooden spatula to scrape the pan clean as the liquid bubbles. Stir and scrape about 30 seconds to 1 minute, until the liquid cleans itself up and about one-third of it has boiled away. Take a taste. If it needs salt or pepper, add now. Turn off the heat. If the sauce still has little pieces of browned bits, and these are annoying to you, pour the sauce through a mini-strainer held over a serving pitcher.

The longer the liquid boils, the more condensed the flavor, and the less sauce you'll have. It is not uncommon to end up with half as much sauce as the original volume of liquid. That's why a sauce of this type is called a "reduction."

Gravy on the other hand takes its characteristic flavour from the fat and juices (drippings) of a roasted piece of meat. Once the roast is done and removed from the pan, skim off the majority of the fat. Place the roasting pan on the stove on medium heat. Sprinkle or dust with all-purpose flour and mix well to create what is known as roux. Add hot vegetable water or broth and simmer until gravy is smooth in texture and there is no longer an uncooked flour taste. Season with salt and pepper and you have the perfect gravy.

Tip: Today there are many commercially prepared sauce and gravy mixes available in powder and liquid form your local grocer. These will work fine in a pinch, but there is nothing better than preparing your own gravy or sauce derivation.

Gravy is made from pan juices, too, but more importantly, relies on the thickening power of flour or cornstarch. In this method, we'll be using flour.

Gravy can be lean because the pan juices, which contain fat, can be nearly completely de-fatted in a short time. Even if pan juices can be chilled 5 to 15 minutes in a measuring cup, fat will be quite visible as a yellow layer hanging over the remaining liquid. Depending on what you've roasted, you might end up with more fat than juice, as with duck.

To make gravy: After roasting a turkey or piece of meat, scrape everything that's in the pan into a glass 2-cup measuring cup and refrigerate 5 to 15 minutes. Spoon off the golden layer of fat. A bulb baster will suck it up easily.

After the fat is gone, add tap water until you've got 1 1/2 to 2 cups, and pour it all into a medium-sized pot. Bring to a boil, uncovered. Boil until nearly half of it cooks away. Dissolve 3 tablespoons flour in 3 tablespoons cold water until a smooth paste forms. Slowly pour and stir the flour paste, a little at a time, into the boiling juices until gravy becomes as thick as you like. You may not have to add all of it! Add salt and pepper, and gravy is yours!

CHECK YOUR PROGRESS

1. How do we prepare POMEGRANATE MOLASSES ?
2. What is Harissa?
3. What is the difference between gravy and sauce?

4.15 INTRODUCTION TO SOUP

Soup is a primarily liquid food, generally served warm (but may be cool or cold), that is made by combining ingredients such as meat and vegetables with stock, juice, water, or another liquid. Hot soups are additionally characterized by boiling solid ingredients in liquids in a pot until the flavors are extracted, forming a broth.

Evidence of the existence of soup can be found as far back as about 20,000 BC. Boiling was not a common cooking technique until the invention of waterproof containers (which probably came in the form of clay vessels). Animal hides and watertight baskets of bark or reeds were used before this. To boil the water hot rocks were used. This method was also used to cook acorns and other plants.

The word *soup* comes from French *soupe* ("soup", "broth"), which comes through Vulgar Latin *suppa* ("bread soaked in broth") from a Germanic source, from which also comes the word "sop", a piece of bread used to soak up soup or a thick stew.

The word *restaurant* (meaning "[something] restoring") was first used in France in the 16th century, to refer to a highly concentrated, inexpensive soup, sold by street vendors, that was advertised as an antidote to physical exhaustion. In 1765, a Parisian entrepreneur opened a shop specializing in such soups. This prompted the use of the modern word *restaurant* for the eating establishments.

In the US, the first colonial cookbook was published by William Parks in Williamsburg, Virginia, in 1742, based on Eliza Smith's *The Compleat Housewife; or Accomplished Gentlewoman's Companion* and it included several recipes for soups and bisques. A 1772 cookbook, *The Frugal Housewife*, contained an entire chapter on the topic. English cooking dominated early colonial cooking; but as new immigrants arrived from other countries, other national soups gained popularity. In particular, German immigrants living in Pennsylvania were famous for their potato soups. In 1794, Jean Baptiste Gilbert Payplat dis Julien, a refugee from the French Revolution, opened an eating establishment in Boston called "The Restorator", and became known as the "Prince of Soups". The first American cooking pamphlet dedicated to soup recipes was written in 1882 by Emma Ewing: *Soups and Soup Making*.

Portable soup was devised in the 18th century by boiling seasoned meat until a thick, resinous syrup was left that could be dried and stored for months at a time.

Soups are similar to stews, and in some cases there may not be a clear distinction between the two; however, soups generally have more liquid than stews.

4.16 CLASSIFICATION OF SOUP

Soups can be divided into three basic categories: clear or un-thickened soups, thick soups, and special soups that don't fit the first two categories.

Most of these soups, no matter what their final ingredients may be, are based on stock. Thus, the quality of the soup depends on the stock-making skills discussed earlier.

Clear Soups

Clear soups are all based on a clear, un-thickened broth or stock. They may be served plain or garnished with a variety of vegetables and meats.

1. Broth and bouillon are two terms used in many ways. ln general, they both refer to simple, clear soups without solid ingredients. We can define broth as a flavorful liquid obtained from the simmering of meats and/or vegetables.

2, Vegetable soup is a clear, seasoned stock or broth with the addition of one or more vegetables and, sometimes, meat or poultry products and starches.

3. Consommé is a rich, flavorful stock or broth that has been clarified to make it perfectly clear and transparent. The process of clarification is a technique we study in detail.

Far from being just a plain old cup of broth, a well-made consommé is one of the greatest of all soups. Its sparkling clarity is a delight to the eye, and its rich, full flavor, strength, and body make it a perfect starter for an elegant dinner.

Thick Soups

Unlike clear soups, thick soups are opaque rather than transparent. They are thickened either by adding a thickening agent, such as a roux, or by puréeing one or more of their ingredients to provide a heavier consistency.

1. Cream soups are soups thickened with roux, beurre manié, liaison, or other added thickening agents, plus mitk and/or cream. They are similar to velouté and béchamel sauces-in fact, they may be made by diluting and flavoring either of these two leading sauces,

Cream soups are usually named after their major ingredient, as in cream of chicken or cream of asparagus.

2. Purées are soups naturally thickened by puréeing one or more of their ingredients. They are not as smooth and creamy as cream soups. Purées are normally based on starchy ingredients. They may be made from dried legumes (such as split pea soup) or from fresh vegetables with a starchy ingredient, such as potatoes or rice, added. Purées may or may not contain milk or cream.

3 Bîsques are thickened soups made from shellfish. They are usually prepared like cream soups and are almost always finished with cream. The term bisques sometimes used on menus for a

variety of vegetable soups. In these cases, it is really a marketing term rather than a technical term, so it is impossible to give a definition that covers all uses.

4. Chowders are hearty soups made from fish, shellfish, and/or vegetables. Although they are made in many ways, they usually contain milk and potatoes.

5. Potage is a term sometimes associated with thick, hearty soups, but it is actually a general term for soup. A clear soup is called a *potage clair* in French.

Specialty and National Soups

This is a catch-all category for soups that don't fit well into the main categories and soups that are native to particular countries or regions.

Specialty soups are distinguished by unusual ingredients or methods, such as turtle soup, gumbo, peanut soup, and cold fruit soup.

Cold soups are sometimes considered specialty soups, and, in fact, some of them are.

But many other popular cold soups, such as jellied consommé, cold cream of cucumber soup, and vichyssoise (vee shee swahz) are simply cold versions of basic clear and thick soups.

Vegetarian Soups and Low-Fat Soups

A great variety of vegetable-based soups are suitable for vegetarian menus. Vegetable soups for vegans must contain no meat or any other animal product and must be made with water or vegetable stock. To bind thick soups, use starch slurry or a roux made with oil rather than butter. Lacto-vegetarians, on the other hand, accept soups containing butter, milk, or cream.

Because the appeal of vegetarian vegetable soups depends entirely on the freshness and the quality of the vegetables and not on the richness of meat stocks, be especially careful to use high-quality ingredients and to avoid overcooking.

Clear soups are especially suitable for people seeking low-fat foods. Consommés and clear vegetable soups are virtually fat-free, specialty if the vegetables were not sweated in fat before being simmered.

Thick soups can be kept low in fat by thickening them with a slurry of starch (such as arrowroot, potato starch, or cornstarch) and cold water rather than with a roux. For cream soups, reduce or omit the cream and instead use evaporated skim milk. Purée soups are usually more adaptable than cream soups to low-fat diets because the vegetable purée adds body and richness to the soup without requiring added fat. A little yogurt or evaporated skim milk can be used to give creaminess to a purée soup. Even garnishing a serving of soup with a teaspoonful of whipped cream gives a feeling of richness while adding only a gram or two of fat.

CHECK YOUR PROGRESS

1. What is meant by national soup?
2. What is meant by Puree Soup?
3. What are the broad categories of soups?

4.17 PREPARATION OF SOUP

Preparation of Cream Soup

Ingredients

White vegetable (leek, celery or celeriac)	80g (3oz)
Butter	60g (2oz)
Flour	20-25 g (1 oz)
Warm Stock (fish chicken vegetable, veal, beef or game)	1.2 ltr or 2 pint
Double Cream salt	100 ml (3 fl oz)
Spices	

Procedure

Trim and wash vegetable and peel the celeriac. Chop them fine.

Melt half the butter over low heat, not allowing it to turn brown

Add vegetables, gently fry for 2-3 min till they are transparent

Sprinkle over the flour. Fry gently for 2-3 min

Remove from the heat and set aside to cool

Beat in the stock using a whisp until you get smooth fluid.

Bring to the boil, keep beating constantly.

Lower the heat. Simmer about 20-25 min.

Add the cream. Bring back to boil. Season with spices.

Rub the soup through fine sieve. Gradually beat in the remaining butter.

Serve in soup plates.

(You may add diced meat or vegetables dumplings, cooked rice and chopped herbs. You may turn the cream soup into veloute soup if you thicken it with egg yolk and cream.)

Clear Vegetable Soup

Yield: 6 ltr, (24 portions of 250 ml each)

Ingredient	**Qnt**	**Procedure**
Butter or chicken fat	**125 g**	**1. Heat the butter in a heavy saucepot over medium-low heat.**
Onion small diced	**750 g**	**2. Add the onions, carrots, celery and turnip. Sweat vegetables in the butter over low heat until about half cooked. Do not let them brown.**
Carrots, small dice **Celery, small dice** **Turnip, small dice**	**500 g** **500 g** **375 g**	
Chicken stock	**6L**	**3. Add the stock. Bring to a boil and skim carefully. Simmer until vegetables are just barely tender.**
Drained canned tomatoes, **coarsely chopped**	**500 g**	**4. Add the tomatoes and simmer another 5 minutes.**
Salt	**To taste**	**5. Degrease the soup and season with salt and white pepper**
White pepper	**To taste**	**6. Just before serving, add the peas.**
Frozen peas, thawed	**To taste**	

(Per serving: Calories, 80; Protein, 3 g, Fat, 4.5 g(46%. cal.); Cholesterol, 15 mg;

Carbohydrates,9 g; Fiber, 2 g; Sodium,125mg.)

Clear Vegetable Soup with Cranberry Beans

VARIATIONS

Other vegetables may be used in addition to or in place of one or more of the vegetables in basic recipe.

Add with the vegetables sweated in butter: Leeks, Green cabbage, Rutabagas, Parsnips.

Add to simmering soup, timing the addition so all vegetables are done at the same time: Potatoes, Lima beans, Green beans , Corn.

Other cuts may be used for the vegetables instead of small dice, such as bâtonnet, jutienne, or paysanne.

Vegetable Rice Soup

Add 1.5 to 2 cups (350-500 mL) cooked rice to finished soup.

Chicken Vegetable Rice Soup

Add 375 g cooked, diced chicken to vegetable rice soup.

Piquant Vegetable Soup with Chickpeas

YIELD: 6 Ltr, 24 PORTIONS (250 ml each)

Ingredient	Qnt	Procedure
Vegetable oil	**60 mL**	**1. Heat the oil in a soup pot over moderate heat.**
Red onion, small dice	**625 g**	**2. Add onion, garlic, bell pepper, and green chile. Sweat the vegetables in the oil over low heat until they are about half cooked. Do not let them brown.**
Garlic, chopped	**15 mL**	**3. Add the stock. Bring to a boil and skim carefully. Simmer until the vegetables are just barely tender.**
Green bell pepper, small dice	**500 g**	**4. Add the tomatoes, chickpeas, and corn. Simmer another 5 minutes.**
Jalapeño or other green chile, cut brunoise	**60-125 g**	**5. Shortly before serving, add the cooked green beans. (Beans should be cooked separately and added at the end so their color won't be destroyed by the acidity of the tomatoes.)**
Chicken stock or vegetable stock	**5L**	**6. Add salt and white pepper to taste. Add hot pepper sauce, if desired.**
Tomatoes, peeled, seeded, and chopped	**625 g**	
Cooked chickpeas	**625 g**	
Corn kernels, frozen or fresh	**250 g**	

Green beans, cooked untiI just tender **and cut into l-in. (1-cm) pieces**	**250 g**	
Salt **White pepper/hot pepper sauce**	**To taste**	

Per serving: Calories, 1 60; Protein, 8 g; Fat, 1 g (45% cal.); Cholesterol, 20 mg; carbohydrates, 14 g; Fiber, 3 g; Sodium, 105 mg.

4.18 SALIENT FEATURES OF SOUP

NATIONAL SOUPS

Soup	Origin
Minestrone	Italy
Green turtle soup	England
French onion soup	France
Scotch broth	Scotland
Mulligatawny	India/ Sri lanka
Gazpacho	Spain
Manhattan clam chouder	America
Paprika	Hungary
Camaro	Brazil

Broths

The difference between a broth and a stock is that a broth, according to the most common definition, is made by simmering meat and vegetables, while a stock is made by simmering bones and vegetables. Because of this difference, a well-made stock is generally richer in gelatin content than a broth, because gelatin is derived from cartilage and connective tissue. A broth, on the other hand, usually has a more pronounced flavor of meat or poultry than a stock. A more neutral flavor is desired in a stock, which is used as the base for many sauces as well as soups. A broth, on the other hand, is an excellent choice as the base of a soup when a distinct meat flavor is desired.

Nevertheless, broths are not often specially made in food-service operations. The cost of the meat makes them expensive, unless the meat can be used for another purpose, or unless the restaurant has a good supply of meat trimmings that might otherwise be wasted. Instead, broth is usually a byproduct of simmering meat or poultry. The recipes for Simmered Fresh Beef Brisket and for "Boiled" Fowl produce

not only the cooked meat or poultry but also flavorful broths that can be served as soups when properly seasoned and garnished.

Note that the broths resulting from both these recipes are white. To prepare a brown meat broth, follow the procedure in the recipe for Simmered Fresh Beef Brisket, but brown the meat and mirepoix well before adding water. Flavorful cuts such as beef shank, chuck, and neck are good for making broths.

Consommé

When we define consommé as a clarified stock or broth, we are forgetting the most important part of the definition. The word consommé means, literally, "completed" or "concentrated". in other words, a consommé is a strong, concentrated stock or broth. ln classical cuisine, this was all that was necessary for a stock to be called a consommé. ln fact, two kinds were recognized: ordinary (or unclarified) consommé and clarified consommé.

Rule number one for preparing consommé is that the stock or broth must be strong, rich, and full-flavored. Clarification is second in importance to strength. A good consommé, with a mellow but full aroma and plenty of body (from the natural gelatin) you can feel in your mouth, is one of the great pleasures of fine cuisine. But clarification is an expensive and time-consuming procedure, and, quite frankly, it's not worth the trouble if the soup is thin and watery.

How Clarification Works

Coagulation of proteins was an important subject in our discussion of stock-making because one of our major concerns was how to keep coagulated proteins from making the stock cloudy. Strangely enough, this same process of coagulation enables us to clarify stocks to perfect transparency.

Remember that some proteins, especially those called albumins, dissolve in cold water. When the water is heated, they gradually solidify or coagulate and rise to the surface. lf we control this process carefully, these proteins collect all the tiny particles that cloud a stock and carry them to the surface. The stock is then left perfectly clear. lf, on the other hand, we are not careful, these proteins break up as they coagulate and cloud the liquid even more, just as they can do when we make stock.

CHECK YOUR PROGRESS

1. What is meant by broth?
2. Describe consommé?
3. What is meant by clarification?

4.19 CARE AND PRECAUTION

Emergency Procedures

1. Clarifying hot stock.

If you do not have time to cool the stock properly before Clarifying, at least cool it as much as you can. Even 10 minutes in a cold-water bath helps. Then, mix ice cubes or crushed ice with the clear meat. This will help keep it from coagulating when the hot stock hits it. Proceed as in the basic method.

Finally review your production planning so you can avoid this emergency in the future.

2. Clarifying without meat.

In a pinch, you can clarify a stock with egg whites alone. Use at least 3 or 4 egg whites per gallon (4 ltr) stock, plus mirepoix if possible.

Great care is necessary because the raft will be fragile and easily broken up.

Egg whites and mirepoix alone are often used for clarifying fish stocks.

3. Failed Clarification.

If the clarification fails because you let it boil, or for some other reason, it can still be rescued, even if there is no time for another complete clarification.

Stain the consommé, cool it as much as you can, then slowly add it to a mixture of ice cubes and egg whites. Carefully return to a simmer as in the basic method and proceed with the clarification.

This should be done in emergencies only. The ice cubes dilute the consommé, and the egg white clarification is risky.

4. Poor color

Beef or veal consommé made from brown stock should have an amber color. It is not dark brown like canned consommé. Chicken consommé is very pale amber.

It is possible to correct a pale consommé by adding a few drops of caramel color to the finished soup, but for best results, check the color of the stock before clarification. If it is too pale, cut an onion in half and place it cut side down on a flat top range until it is black, or char it under a broiler. Add this to the clear meat. The caramelized sugar of the onion will color the stock.

4.20 EMERGING TRENDS IN SOUPS

We will see a report on trends in soup manufacturing as published in the USA.

The report seeks to find the recipe for success for soup and side dish manufacturers. Manufacturers consider the facts that more consumers are eating at home and they don't want to cook from scratch. Yet manufacturers also must address health, convenience and flavor trends if they want to grow category sales.

After years of moderate slow down between 2008 and 2011 and slow growth between 2011 and 2013, sales of pre-packaged soup are expected to continue growing slowly between 2013 and 2018, from $6.9 billion to $8 billion in the USA.

Ready to eat (RTE) wet soups lead the market with $2.1 billion in 2013 for 31.2% share, ahead of condensed wet soups, which sold $1.8 billion in 2013 for 26.2% share. Meanwhile, dry soup makes up 23.8% share with $1.6 billion in 2013, followed by wet broth/stock ($1 billion, 14.8% share) and refrigerated/frozen fresh soup ($279 million, 4.1% share).

Mintel, a global market intelligence agency, forecasts that the US soup market will grow slowly between 2013 and 2019, but brands can help spur growth by offering more better-for-you soups, expanded flavor varieties, and more convenient packaging that allows for heating and eating from the same container and easy consumption.

The slow economic rebound continues to force many consumers to prepare meals at home, and store-bought soup represents a relatively affordable meal solution (80% of respondents agree) for consumers who are still feeling the impact of the recession. Unemployment has declined over 2013 but remained steady in early 2014, and many job seekers have given up looking for work, and consumer confidence remains volatile from month to month, underscoring the anxiety many consumers feel about the economy and their own spending power, which means that soup brands should use affordability as at least one element of their marketing strategies.

Also factoring into sales of pre-packaged soup are innovations in flavor, convenience, and nutrition. Progresso recently launched its Artisan brand line, said to contain fresh ingredients in flavors such as Rustic Tomato with Chicken & Dumplings; Campbell's Soup on the Go features microwaveable, sippable containers; and Amy's Kitchen's Light in Sodium soup range offers low-sodium versions of its regular soups.

Nearly two-thirds of respondents report buying condensed canned/boxed/carton soup for anyone in the household in the last six months, while more than half report buying RTE canned/boxed/carton soup and RTE broth. Condensed wet soup benefits from multiple uses, from soup itself (requiring the addition of water or milk during heating) to a base ingredient for other home-cooked dishes. Similarly, RTE broth can be eaten alone as a warming, sippable soup or used as a base for other dishes. Meanwhile, RTE wet soup makes for a fast and easy meal,

requiring no additional water or milk to heat and eat. Fewer than half of respondents report buying other types of soup for anyone in the household, including bouillon cubes, dry soup, RTE hot soup, RTE refrigerated soup, soup kits and frozen soup.

More than half of respondents who buy soup for themselves report eating soup for lunch. For busy consumers, there is often little time or opportunity to prepare lunch, which means time-saving products such as pre-packaged soup constitute a good lunchtime solution.

Fewer than half of respondents report eating soup for dinner or as part of dinner, indicating that brands can do more to position their products as good dinner options from offering recipes that call for their products to suggestions for side dishes such as salad or bread to round out a dinner.

Only 14% of respondents report eating soup as a snack between meals.This indicates that most consumers do not view soup as good for snacking, possibly because soup is not always as easy to open and eat as other snack foods such as chips or candy. Some brands have made convenience a key attribute to facilitate snacking or eating on the go, such as Campbell's Soup on the Go, which grew 39.6% between Dec. 30, 2012, and Dec. 29, 2013, reaching $43 million.

Some 56% of respondents who buy soup for themselves report eating soup to satisfy hunger, a good result for the market because it indicates that many buyers find soup filling. Some 56% also report eating it to warm up during cold weather, indicating that for many consumers soup is a seasonal dish. More than a third report eating soup because they were craving it, and more than a third report eating it because it is convenient.

Respondents report most interest in full serving of vegetables Nearly nine in 10 respondents who buy soup for the household report any interest (interest in and willingness to pay more for or interest in but not willing to pay more for) in soups with a full serving, or more, of vegetables. Many soups are high in vegetable content, although not all contain a full serving of vegetables, suggesting that adding more vegetables will appeal to those for whom soup is a source of vegetable intake.

Eight in 10 respondents report any interest in low-sodium soups. Sodium content is a significant concern for many buyers, and many brands offer low-sodium versions of their regular soups, although low-sodium brands run the risk of consumer perceptions that they sacrifice flavor. Focusing on other spices in low-sodium soups, such as curry or rosemary, may help low-sodium brands persuade buyers that flavor is still the main component in their products.

Close to eight in 10 respondents report any interest in soups with added vitamins and minerals and soups with high fiber. Brands that help users get the nutritional content they require through

supplemental ingredients such as these will likely resonate among consumers looking for BFY (better-for-you) soups. More than three quarters of respondents report any interest in all-natural/organic soup ingredients. Consumers often perceive all-natural/organic foods to be better for their health than regular foods, a perception that all-natural/ organic brands can leverage to drive sales.

A third of respondents who do not buy soup for the household say they do not because they prefer homemade soup. A number of brands have rolled out products that combat the perception that pre-packaged soups compare unfavorably with homemade soup, such as Campbell's Homestyle and Progresso Artisan, which incorporate wholesome ingredients and no preservatives.

Overall, it appears that slow market growth stems from a number of factors, including the perception among many consumers that while soup is a relatively healthy meal, soups that contain high amounts of sodium, artificial ingredients, and/or preservatives actually may pose a health risk. This means that—in this age of hyper-scrutiny and quick access to health and nutritional information—soup brands can no longer rely on their wholesome image to sell their products.

Instead, brands must take extra steps to burnish their nutritional image, such as adding more vegetables or supplemental ingredients such as vitamins and minerals or extra fiber. Brands also must do more to expand the flavor varieties of their products, borrowing from the cuisine of other cultures to offer more exotic soups, adding soups deriving from traditional sauces, and staying on top of food trends to provide soups that satisfy the ever-changing tastes of consumers.

Not surprisingly, there also is a "to-do" list for side dish manufacturers looking to grow category sales.

For the record, Mintel combines the prepared meal and side dish categories. Mintel estimates total retail sales of prepared meals and side dishes reached $9.9 billion in 2013, at current prices. The category declined 4% from 2008-13 as consumers prefer products with natural ingredients, and better-for-you claims. Within the category, refrigerated meals and side dishes improved their respective sales from 2008-13; however, their sales were not enough to offset sharp declines within the much larger frozen single-serve and multi-serve meal segments.

The overall category is expected to decline another 5% from 2013-18, reaching $9.5 billion, at current prices. Manufacturers' abilities to promote the convenience of these products, meet consumer preferences for more natural and nutritional products, and segment products based on consumer need, can all help contribute to future growth.

The only two prepared meal and side dish segments to experience sales increases during the past five years were the refrigerated segments. The refrigerated meals and refrigerated side dishes segments represent just 22% of the overall category, collectively, but experienced sales increases of 10.5% and 4.9%, respectively, from2011-13. Of note, Bob Evans' sales increased nearly 7% from 2013 reaching $221.8 million, as a result of sales of its homestyle refrigerated side dishes.

Frozen side dishes, which represent the smallest share of the market at 3.3%, declined nearly 8% from 2011-13, reaching sales of $325 million. The smaller format of many of these items lends themselves to snacking occasions which could help the segment; however, these items still struggle to stand out against frozen meals that come pre-packaged with side dishes.

Frozen meals have the highest household penetration rate with 73% of households indicating a purchase of single-serve or multi-serve frozen meals within the past six months. In comparison, slightly more than one third (35%) have purchased any type of refrigerated meals, and 48% have purchased any type of side dishes. The convenience of these items, and their versatility across meal occasions, are two reasons for their high household purchase, though there is room to improve their taste with better ingredients and quality.

Single-serve options are more popular among households, compared to multi-serve options, due in part to a decline in household size, as well as interest in single-serve options for controlling portion size and snacking. Compared to women, men are significantly more likely to have purchased refrigerated meals (41% of men, 31% of women), as well as frozen side dishes (39% of men, 35% of women). Past purchases of both prepared meals and side dishes tend to skew toward consumers aged 25-44.

Convenience and ease of use are the top reasons buyers of prepared meals and side dishes make such purchases. Some 76% purchase prepared meals or sides because they are useful to have on hand when they don't want to cook, while 72% indicate these products are quicker than preparing food from scratch.

Prepared meals and side dish purchasers most often consider reduced claims and added nutrition when buying these items. Some 40% of consumers who use prepared meals and side dishes consider products with reduced fat or calories and 38% look for all natural ingredients, a claim that has grown steadily from 2009-14.

Compared to older purchasers, younger purchasers, specifically those aged 18-44, are more likely to consider ingredient claims such as high protein and whole grain, as well as products for specific diets, including vegetarian, gluten- and dairy-free options. Although consumers are

motivated by convenience when purchasing prepared meals and side dishes, products with better-for-you claims can make it easier for consumers aspiring to make better eating decisions.

The leading factors that would influence consumers to purchase more prepared meals and side dishes are natural ingredients (39%), and higher-quality or gourmet items (35%). Usability and value-related factors also are most important to consumers.

Women are significantly more likely than men to cite factors related to ingredients as motivators for increased purchase of prepared meals and side dishes. Some 43% of women indicate natural ingredients would influence them to purchase more of these items, compared to 34% of men, while 21% indicate a limited number of ingredients would be an influence, compared to 14% of men.

Consumers aged 18-24 are least likely to indicate higher quality or gourmet items would influence them to purchase more prepared meals and side dishes (27%). The higher price point of these items, combined with lower household income among younger consumers, indicates they are not willing to splurge on gourmet options.

(*Source: Soup-US-April 2014/ Source: Prepared Meals and Side Dishes-US-May 2014)*

4.21 SALADS: AN INTRODUCTION

A salad is a dish consisting of small pieces of food, which may be mixed with a sauce or salad dressing. They are typically served cold. Salads can incorporate a variety of foods including vegetables, fruits, cheese, cooked meat, eggs, grains and nuts.

Garden salads use a base of leafy greens like lettuce, arugula, kale or spinach; they are common enough that the word salad alone often refers specifically to garden salads. Other types include bean salad, tuna salad, fattoush, Greek salad, and Japanese sōmen salad (a noodle-based salad). The sauce used to flavor a salad is commonly called a salad dressing; well-known types include ranch, Thousand Island, and vinaigrette. Vinaigrette comes in many varieties; one version is a mixture of olive oil, balsamic vinegar, herbs and seasonings.

Most salads are served cold, although some, such as south German potato salad, are served warm. Some consider the warmth of a dish a factor that excludes it from the salad category calling the warm mixture a casserole, a sandwich topping or more specifically, name it for the ingredients which comprise it.

Salads may be served at any point during a meal, such as:

- Appetizer salads, light, smaller portion-salads to stimulate the appetite as the first course of the meal.
- Side salads, to accompany the main course as a side dish.
- Main course salads, usually containing a portion of heartier fare, such as chicken breast, salmon or slices of beef.
- Dessert salads, sweet versions containing fruit, gelatin, sweeteners and/or whipped cream, or just fruit, which is called a fruit salad

The Romans and ancient Greeks ate mixed greens with dressing. In his 1699 book, Acetaria: A Discourse on Sallets, John Evelyn attempted with little success to encourage his fellow Britons to eat fresh salad greens. Mary, Queen of Scots, ate boiled celery root over greens covered with creamy mustard dressing, truffles, chervil, and slices of hard-boiled eggs.

The United States popularized mixed greens salads in the late 19th century. Salads including layered and dressed salads were popular in Europe since Greek imperial and particularly Roman imperial expansions. Several other regions of the world adopted salads throughout the second half of the 20th century. From Europe and the Americas to China, Japan, and Australia, salads are sold in supermarkets, at restaurants and at fast food chains. In the US market, restaurants will often have a "Salad Bar" laid out with salad-making ingredients, which the customers will use to put together their salad. Salad restaurants were earning more than $300 million in 2014.

4.22 TYPES OF SALADS

Green salad

Fig 4.04: *A green salad*

A green salad or garden salad is most often composed of leafy vegetables such as lettuce varieties, spinach, or rocket (arugula). The salad leaves may be cut or torn into bite-sized fragments and tossed together (called a tossed salad), or may be placed in a predetermined arrangement (a composed salad). They are often adorned with garnishes such as nuts or croutons.

A wedge salad is made from a head of lettuce (such as iceberg) halved or quartered, with other ingredients on top.

Vegetable salad

Vegetables other than greens may be used in a salad. Common raw vegetables used in a salad include cucumbers, peppers, tomatoes, onions, spring onions, red onions, carrots, celery, and radishes. Other ingredients, such as mushrooms, avocado, olives, hard boiled egg, artichoke hearts, heart of palm, roasted red bell peppers, green beans, croutons, cheeses, meat (e.g. bacon, chicken), or seafood (e.g. tuna, shrimp), are sometimes added to salads.

Bound salad

Fig 4.05: *American-style potato salad with egg and mayonnaise*

A "bound" salad can be composed (arranged) or tossed (put in a bowl and mixed with a thick dressing). They are assembled with thick sauces such as mayonnaise. One portion of a true bound salad will hold its shape when placed on a plate with an ice-cream scoop. Examples of bound salad include tuna salad, pasta salad, chicken salad, egg salad, and potato salad.

Bound salads are often used as sandwich fillings. They are popular at picnics and barbecues, because they can be made ahead of time and refrigerated.

Main course salads

Fig 4.06: *A traditional Slovak fish salad of cod in mayonnaise*

Main course salads (also known as "dinner salads" and commonly known as "entrée salads" in North America) may contain grilled or fried chicken pieces, seafood such as grilled or fried shrimp or a fish steak such as tuna, mahi-mahi, or salmon or sliced steak, such as sirloin or skirt. Caesar salad, Chef salad, Cobb salad, Chinese chicken salad and Michigan salad are dinner salads.

Fruit salads

Fig 4.07: *Fruit Salad*

Fruit salads are made of fruit, and include the fruit cocktail that can be made fresh or from canned fruit.

Dessert salads

Dessert salads rarely include leafy greens and are often sweet. Common variants are made with gelatin or whipped cream; e.g. jello salad, pistachio salad, and ambrosia. Other forms of dessert salads include snickers salad, glorified rice, and cookie salad popular in parts of the Midwestern United States.

Composed salad

A composed salad is a salad arranged on a plate rather than put into a bowl. It can be used as a meal in itself rather than as a part of a meal.

4.23 DRESSINGS USED IN SALADS

Sauces for salads are often called "dressings". The concept of salad dressing varies across cultures.

In Western culture, there are two basic types of salad dressing:

- Vinaigrette;
- Creamy dressings, usually based on mayonnaise or fermented milk products, such as yogurt, sour cream (crème fraîche, smetana), buttermilk;

Vinaigrette /vɪnəˈgrɛt/ is a mixture (emulsion) of salad oil and vinegar, often flavored with herbs, spices, salt, pepper, sugar, and other ingredients. It is also used as a sauce or marinade.

In North America, mayonnaise-based Ranch dressing is most popular, with vinaigrettes and Caesar-style dressing following close behind. Traditional dressings in France are vinaigrettes, typically mustard-based, while sour cream (smetana) and mayonnaise are predominant in eastern European countries and Russia. In Denmark, dressings are often based on crème fraîche. In southern Europe, salad is generally dressed by the diner with olive oil and vinegar.

In Asia, it is common to add sesame oil, fish sauce, citrus juice, or soy sauce to salad dressings.

The following are examples of common salad dressings:

- Blue cheese dressing
- Caesar dressing
- Extra virgin olive oil
- French dressing
- Ginger dressing
- Honey Dijon
- Hummus
- Italian dressing
- Louis dressing
- Ranch dressing
- Russian dressing
- Tahini
- Thousand Island dressing
- Vinaigrette
- Wafu dressing

Toppings and garnishes

Popular salad garnishes are nuts, croutons, anchovies, bacon bits (real or imitation), garden beet, bell peppers, shredded carrots, diced celery, watercress, sliced cucumber, parsley, sliced mushrooms, sliced red onion, radish, french fries, sunflower seeds (shelled), real or artificial crab meat (surimi) and cherry

tomatoes. Various cheeses, berries, seeds and other ingredients can also be added to green salads. Cheeses, in the form of cubes, crumbles, or grated, are often used, including blue cheese, Parmesan cheese, and feta cheese. Color considerations are sometimes addressed by using edible flowers, red radishes, carrots, various colors of peppers, and other colorful ingredients.

4.23 PREPARATOPN OF SALADS

Caesar salad

A Caesar salad is a salad of romaine lettuce and croutons dressed with parmesan cheese, lemon juice, olive oil, egg, Worcestershire sauce, anchovies, garlic, and black pepper. It is often prepared tableside.

The salad's creation is generally attributed to restaurateur Caesar Cardini, an Italian immigrant who operated restaurants in Mexico and the United States. Cardini was living in San Diego but also working in Tijuana where he avoided the restrictions of Prohibition. His daughter Rosa (1928–2003) recounted that her father invented the dish when a Fourth of July 1924 rush depleted the kitchen's supplies. Cardini made do with what he had, adding the dramatic flair of the table-side tossing "by the chef." A number of Cardini's staff have said that they invented the dish.

Ingredients

Common ingredients in many recipes:

- romaine or cos lettuce
- olive or vegetable oil
- fresh crushed garlic
- salt to taste
- fresh-ground black pepper
- lemon or lime juice, freshly squeezed
- Worcestershire sauce
- raw or coddled egg yolks
- freshly grated Parmesan cheese
- freshly prepared croutons

Variations

One of the most common Caesar salad variations, shown here topped with grilled chicken

There are limitless variations. However, some of the more common are:

- other varieties of lettuce
- grilled poultry (most often chicken), meat, shellfish, or fish
- capers

- Romano cheese
- anchovies
- bacon

Varieties of salad

Name	Image	Origin	Type	Description
Acar		Indonesia, Malaysia, andSingapore	Vegetable salad	Made from yardlong eans, carrots and cabbage which re pickled in vinegar and dried chili eppers. The vegetables are then ossed in ground peanuts.
Afghan salad		Afghanistan	Vegetable salad	Prepared with the primary ingredients of tomato, cucumber, onion, carrot, cilantro, mint and lemon juice
Ambrosia		United States	Fruit salad	Mixed with sour cream and/or sweetened whipped cream, miniature marshmallows,pineapple, mandarin oranges and coconut. Variations include raspberries and strawberries.
Antipasto		Italy	Meat salad	Italian salami,Italian cheese, lettuce, olives, Italian dressing
Arab salad[citation needed]		Arab cuisine	Vegetable salad	Combines many different vegetables and spices, and often served as part of a mezze

Name	Image	Origin	Type	Description
Asinan		Indonesia	Vegetable or fruit salad	A pickled (through brined or vinegared) vegetable or fruit dish, commonly found in Indonesia. The vegetable asinan is preserved vegetables served in a thin, hot, peanut sauce with vinegar, topped with peanuts and krupuk. The fruit asinan is preserved tropical fruits served in sweet, hot and sour vinegar and chili sauce, sprinkled with peanuts.
Bean salad			Bean salad	Mainly composed of cooked pole beans (green beans and/or yellow wax beans), cookedchickpeas (garbanzo beans), cooked kidney beans and sliced or diced fresh beetroot. The beans are marinated in an oil/vinegar vinaigrette, sometimes sweetened with sugar.
Bok l'hong *bok lahong*		Cambodia	Fruit salad	A papaya salad. Herbs added to the salad either as ingredients or garnishes might include kantrop,[2] lime leaves and basil. The dressing may include fish sauce, shrimp paste, dried shrimp, preserved crabs, crushed peanuts and/or lime juice. Other vegetables used may include diced tomatoes and shredded carrots.

Name	Image	Origin	Type	Description
Caesar salad		Mexico	Green salad	Romaine lettuce and croutons dressed with parmesan cheese, lemon juice, olive oil, egg,Worcestershire sauce, anchovies, and black pepper
Cappon magro		Genoa, Italy	Seafood salad	Seafood and vegetables over hard tack arranged into a decorative pyramid and dressed with a rich sauce
Celery Victor		American (cuisine). Invented in 1910 by Victor Hertzler[1] who is also credited by some for inventing crab Louis.[2]	Vegetable salad	Celery hearts simmered in a veal or chicken stock, chilled (often in a citrus or vinegar marinade), tossed with mild peppers, then served Romaine lettuce
Cheese slaw			Cheese salad	a salad consisting of grated cheese, grated carrot and a mayonnaise dressing.[3]
Chef salad			Vegetable and meat salad	Usually made with hard-boiled eggs, strips of ham or another cold cut (such as roast beef,turkey, or chicken), croutons, tomatoes, cucumbers, and cheese (often crumbled), all placed upon a bed of

Name	Image	Origin	Type	Description
				tossed lettuce or other leaf vegetables. Several early recipes also includeanchovies. The dressing on this salad was traditionally Thousand Island dressing, and it may be served with other dressings.
Chicken salad		Worldwide	Meat salad	Any salad that comprises chicken as a main ingredient. Other common ingredients include boiled eggs, mayonnaise, and a variety of mustards.
Chilean salad		Chilean cuisine	Vegetable salad	Contains tomato, onion, coriander and olive oil, and sometimes with chili peppers
Chinese chicken salad		American Chinese cuisine	Meat salad	A salad with chicken flavored by Chinese seasonings, popular in the United States.
Çoban salatası		Turkey	Vegetable salad	A combination of finely chopped tomatoes, cucumbers, onions, green peppers and flat-leaf parsley. The dressing consists of a simple mix of lemon juice, extra virgin olive oil and salt.

Name	Image	Origin	Type	Description
Cobb salad		United States	Vegetable salad	The original recipe contained:[4] lettuce (head lettuce, watercress, chicory, and romaine), tomatoes, crisp bacon, Chicken breast, hard-cooked eggs, avocado, roquefort che ese, chivesand vinaigrette.
Coleslaw		Worldwide	Cabbage	Coleslaw, sometimes is a type of salad consisting primarily of shredded raw cabbage. It may also include shredded carrots.
Crab Louie		United States	Seafood salad	A typical Crab Louie salad consists of[5] crab meat, hard boiled eggs, tomato, asparagus, cucumber and is served on a bed of Romaine lettuce with a Louie dressing based on mayonnaise, chili sauce and peppers on the side. Some recipes include olives and scallions.
Curtido		Central America	Cabbage	A lightly fermented cabbage relish.

Name	Image	Origin	Type	Description
Dressed herring		Russia	Herring and vegetable salad	Diced, salted herring covered with layers of grated, boiled vegetables (potatoes, carrots, beet roots), chopped onions, and mayonnaise.
Egg salad			Egg salad	Egg salad is often used as a sandwich spread, typically made of chopped hard-boiled eggs, mayonnaise, mustard, minced celery or onion, salt, pepper and paprika.
Fattoush		Lebanon	Bread salad	A bread salad made from toasted or fried pieces of pita bread (*khubz 'arabi*) combined with mixed greens and other vegetables.[6]
Fiambre		Guatemala	Meat salad	A traditional Guatemalan salad eaten on November 1 and 2, to celebrate the Day of the Dead(*Día de los Difuntos*) and the All Saints Day (*Día de los Santos*). It is a salad, served chilled, and may be made up from over 50 ingredients.
Fruit salad		Worldwide	Fruit salad	Made with various types of fruit, served either in their own juices or a syrup. Also known as a*fruit cocktail*.

Name	Image	Origin	Type	Description
Gado-gado		Indonesia	Vegetable salad	A traditional dish in Indonesian cuisine, and is a vegetable salad served with a peanut saucedressing, eaten as a main dish.
Garden salad		Worldwide	Green salad	Made with lettuce such as iceberg, romaine or mesclun greens.[7] Other toppings may include: tomatoes, carrots, onions, cucumbers, mushrooms, bell peppers.
Glasswort salad		Turkey		Prepared with glasswort, lemon juice, olive oil[8] and garlic
Glorified rice		United States	Fruit salad	Made from rice, crushed pineapple, egg, sugar, vinegar, flour and whipped cream.[9] It may be decorated with maraschino cherries.[10]
Golbaengi muchim		Korea	Fish salad	Made with Neverita didyma, (a sea snail), dried shredded squid or dried Alaska pollack, vegetables such as sliced cucumber, and shredded scallions, and mixed with a hot and spicy sauce. The sauce is generally made with *gochujang* (chili pepper paste), chili

Name	Image	Origin	Type	Description
				pepper powder, vinegar, sugar, salt, minced garlic, and sesame oil.[11][12]
Greek salad		Greece	Vegetable salad	Made with wedges of tomatoes, cucumber, green bell peppers, red onion, sliced or cubedfeta cheese, and kalamata olives, typically seasoned with salt, black pepper and driedoregano, and dressed with olive oil.
Ham salad			Meat salad	Includes ham, mayonnaise or salad dressing, diced dill or sweet pickles or pickle relish, chopped hard boiled egg, and perhaps onions, celery, cucumber or tomatoes.
Insalata Caprese		Italian region of Campania	Tomato and cheese salad	Made of sliced fresh buffalo mozzarella, tomatoes and basil, and seasoned with salt, pepper, and olive oil.[13]

Name	Image	Origin	Type	Description
Israeli salad		Arab Salad	Vegetable salad	Chopped salad of finely diced tomato and cucumber. Usually made of tomatoes, cucumbers, onions and parsley, and dressed with fresh lemon juice, olive oil and black pepper. Generally, the cucumbers are not peeled. The key is using very fresh vegetables and chopping them as finely as possible.[14]
Jello salad		United States	Fruit salad	Made with flavored gelatin, fruit and sometimes grated carrots or, more rarely, other vegetables. Other ingredients may include cottage cheese, cream cheese, marshmallows,nuts or pretzels.
Karedok		West Java, Indonesia	Vegetable salad	A raw vegetable salad made from cucumbers, bean sprouts, cabbage, legumes, Thai basil, and small green eggplant.
Kinilnat		Philippines	Vegetable salad	The leaves, shoots, blossoms, or the other parts of sweet potato, bitter melon and/or otheredible plants are boiled and drained and dressed with bagoong (preferably) or patis, and sometimes

Name	Image	Origin	Type	Description
				souring agents like calamansi or cherry tomatoes are added, as well as freshly ground ginger.
Kısır		Turkish cuisine	Cereal salad	A side dish made from fine bulgur, parsley, and tomato paste.
Kosambari		Indian cuisine	Vegetable salad	A side dish made from Soaked split green gram dal,Minced cucumber,Grated carrot,Radish,Lemon,cilantro.
Larb		Lao (cuisine) and the Isanregion of Thailand	Meat salad	A spicy meat salad usually made with chicken, beef, duck, turkey, pork or sometimes fish, flavored with fish sauce, lime juice and herbs.
Lyutika		Bulgaria	Vegetable salad	Made from roasted peppers, tomatoes, garlic, onions, and vegetable oil, usually crushed with a pestle in a mortar.

Name	Image	Origin	Type	Description
Macaroni salad		Worldwide	Pasta salad	Made with cooked elbow macaroni pasta served cold and usually prepared with mayonnaise.
Macedonia salad			Fruit salad	Composed of small pieces of fruit or vegetables. The former is eaten as a dessert, the latter as a cold salad.
Matbucha		Morocco[15]	Vegetable salad	Mainly made with tomatoes, roasted peppers, oil and garlic which are cooked together.
Mesclun		Provence, France	Vegetable salad	A salad mix that traditionally mix includes chervil, arugula, leafy lettuces and endive in equal proportions, but modern iterations may include an undetermined mix of fresh and available lettuces and greens.
Michigan salad		United States	Vegetable salad	Green salad usually topped with dried fruit cherries, blue cheese, and a vinaigrette salad dressing.

Name	Image	Origin	Type	Description
Mimosa Salad		Russia	Fish salad	canned fish, hard boiled eggs, cheese, diced potato, onion, butter, with mayonnaise.
Naem khluk		Thailand	Meat salad	Crumbled, deep-fried balls of sticky rice and *naem* (fermented sausage of pork skin mixed with sticky rice) are mixed with sliced shallots, dried chillies, fish sauce and lime juice. It is served with raw vegetables and fresh herbs.
Niçoise salad		Côte d'Azur region of France, originating in and named for the city of Nice, France.	Vegetable salad	Cos lettuce, native Nicoise olives and garnished with tinned anchovies. The salad is served with traditional Dijon vinaigrette.
Olivier salad *Russian salad*		Russia	Potato and meat salad	Diced potato, hard boiled eggs, green peas, pickles, meat (sometimes fish or seafood), with mayonnaise.
Panzanella		Florence, Italy	Bread salad	a bread salad that includes sliced bread and fresh tomatoes flavored with basil, olive oil, and vinegar, often with salt and Black pepper.

Name	Image	Origin	Type	Description
Pao cai		Chinese and Sichuanesecuisine	Vegetable salad	A pickled cabbage salad.
Pasembur		Malaysia	Fish salad	Shredded cucumber, turnip, potato, beancurd, bean sprouts, prawn fritters, spicy fried crab, fried octopus, etc. served with a sweet and spicy nut sauce.
Pasta salad		Worldwide	Pasta salad	Prepared with one or more types of pasta, usually chilled, and most often tossed in a vinegar, oil or mayonnaise-based dressing.
Perigourdine		Périgord, SW France	Vegetable salad	Lettuce with croutons, duck *gesiers* (gizzards), walnut and a vinaigrette dressing made with walnut oil.
Phla mu		Thailand	Meat salad	A spicy Thai salad of grilled pork, lemongrass, mint, culantro and shallots, with a dressing of lime juice, sweet chilli paste (*nam phrik phao*), fish sauce, pounded garlic and bird's eye chili.

Name	Image	Origin	Type	Description
Piyaz		Turkey	Bean salad	Made from any kind of dry beans with hard-boiled egg and dry onions. (Sometimes lettuce is also added for freshness.)
Poke salad		Hawaii	Seafoodsalad	Modern poke typically consists of cubed yellowfin tuna sashimi marinated with sea salt, a small amount of soy sauce, inamona (roasted crushed candlenut), sesame oil, limu seaweed, and chopped chili pepper.
Potato salad		Worldwide	Potato salad	Made from potatoes, and varies throughout different regions of the world. American versions often use mayonnaise, sour cream or milk dressing.[16]
Raheb		Lebanon	Vegetable salad	Made with eggplant (aubergine) and tomatoes.
Rojak		Malaysia, Singapore andIndonesia	Fruit salad	A fruit and vegetable salad dish

Name	Image	Origin	Type	Description
Seven-layer salad		United States	Vegetable salad	Usually includes Iceberg lettuce, tomato, cucumber, onion, sweet peas, hard boiled eggs, sharp cheddar cheese, and bacon pieces.
Sabich salad		Israel	Egg salad	A salad variation of Sabich dish, made from eggplant, boiled eggs/hard boiled eggs, tahini,Israeli salad, potato, parsley and amba. sumac and za'atar can also be added to the dish.
Salat avocado		Israel	Avocado salad	Made with avocados, with lemon juice and chopped scallions (spring onions)
Shepherd's salad		Macedonia	Vegetable and meat salad	Includes tomatoes, cucumbers, onion, roasted red peppers, parsley, sirene (white brine cheese), eggs, kashkaval (yellow cheese), mushrooms and ham
Shopska salad		Bulgaria	Vegetable salad	Made with tomatoes, cucumbers, onion, raw green or roasted red peppers, parsley, andsirene (white brine cheese).[17]

Name	Image	Origin	Type	Description
Shepherd's salad		Macedonia	Vegetable and meat salad	Includes tomatoes, cucumbers, onion, roasted red peppers, parsley, sirene (white brine cheese), eggs, kashkaval (yellow cheese), mushrooms and ham
Shirazi salad		Iran	Vegetable and tomato salad	A very common and popular salad in Iran prepared with chopped tomatoes, cucumber, onion, olive oil, lime juice and mint
Snickers salad		United States	Candy salad	A mix of Snickers bars, Granny Smith apples, and whipped cream or whipped topping (such as Cool Whip) served in a bowl.
Som tam *Som tum*		The Isan region ofThailand.	Fruit salad	A spicy salad made from shredded unripe papaya.
Szałot		Poland.	Potato salad	Made from boiled potatoes, carrots, peas, ham, various sausages, pickled fish, boiled eggs, and dressed with olive oil or mayonnaise.

Name	Image	Origin	Type	Description
Tabbouleh		Lebanon	Herb salad	Finely chopped parsley, bulgur, mint , tomato, scallion, and other herbs with lemon juice, olive oil and various seasonings, generally including black pepper and sometimes cinnamon andalls pice.
Taco salad		United States	Meat salad	A fried tortilla shell stuffed with shredded iceberg lettuce and topped with tomato, Cheddar cheese, sour cream, guacamole, and/or Taco sauce, then topped with taco meat (ground beef) or seasoned shredded chicken. The salad may also include a base of refried beans on the shell before the lettuce is added.
Green papaya salad		Laos	Fruit salad	Made from shredded unripened papaya and often served with sticky rice.
Gỏi nhệch		Vietnam	Rice paddy eel salad	Made from small fry and usual condiments of Gỏi, Vietnamese salad

Name	Image	Origin	Type	Description
Tam mu yo		Thailand	Meat salad	A spicy Thai salad made with *mu yo*, a Thai pork sausage which is often also described in Thailand as "Vietnamese sausage". The dressing is somewhat similar to that of *som tam*.
Tam phonlamai ruam		Thailand	Fruit salad	The fruits used in this particular salad show the fusion aspect of Thai cuisine, as it incorporates "modern" (for Thais) fruit such as apples and grapes besides traditional fruit such as pineapple and guava. The dressing is made with pounded garlic, sugar, chillies, dried shrimp, lime juice and fish sauce, and is similar to that of *som tam*.
Taramosalata		Greece and Turkey	Fish roe	A Greek and Turkish meze. It is traditionally made from taramas, the salted and cured roe of the carp or cod. The roe is mixed with either bread crumbs or mashed potato, and lemon juice, vinegar and olive oil.

Name	Image	Origin	Type	Description
Tuna salad			Fish salad	Usually a blend of three main ingredients: tuna, eggs, and some form of mayonnaise or mustard.
Urnebes		Serbian cuisine	Cheese salad	made of pavlaka, a dairy product that is produced by souring heavy cream and hot chili peppers, with salt and other spices
Vinegret *Russian vinaigrette*		Russia	Vegetable salad	Diced boiled vegetables (beet roots, potatoes, carrots), chopped onions, and sauerkrautand/or pickled cucumbers.[18][19][20] Other ingredients, such as green peas or beans, are sometimes also added.[19][20] Dressed with vinaigrette or simply with sunflower or other vegetable oil.
Waldorf salad		Waldorf Hotel in New York City	Fruit salad	Julienned apple and celery, chopped walnuts, grapes, and mayonnaise

Name	Image	Origin	Type	Description
Watergate salad *Pistachio salad, Hawaiian Surprise, Pistachio Delight, and Picnic Passion*		Midwestern United States	Dessert salad	Made from pistachio pudding, canned fruit, and cool whip.
Wedge salad[21][22]		United States[23]	Vegetable salad	Made from cutting a solid non-shredded head of lettuce into a wedge shape, topped with blue cheese dressing and pieces of cooked bacon.
Wurstsalat		Germany, Alsace, Switzerland and Austria.	Meat salad	A tart sausage salad prepared with vinegar, oil and onions.
Yam khai dao		Thailand	Egg salad	A spicy Thai salad made with fried egg (*khai dao*).
Yam khamin khao kung		Thailand	Spice salad	A spicy Thai salad made with finely sliced "white curcuma" (Curcuma zedoaria), shredded coconut, cooked prawns, sliced shallots, dried chillies, fresh green bird's eye chilies, roasted cashew nuts, and crispy fried onion

Name	Image	Origin	Type	Description
				rings.
Yam kun chiang		Thailand	Meat salad	A Thai salad made with a dried pork sausage of Chinese origin called *kun chiang*. This dish is often eaten with plain rice congee.
Yam naem		Thailand	Meat salad	A Thai salad containing sausage made from fermented raw pork and sticky rice (*naem*).
Yam pla duk fu		Thailand	Fish salad	Crispy fried shredded catfish served with a spicy and tangy green mango salad.
Yam thua phu		Thailand	Vegetable salad	A Thai salad with winged beans, salted eggs, toasted coconut, shallots, fish sauce, lime juice and chillies. Other ingredients, such as squid, can be added to the basic recipe.
Yusheng *Yee sang* or *Yu u sahng*		Teochew cuisine, China	Fish salad	Made with strips of raw fish (most commonly salmon), mixed with shredded vegetables and a variety of sauces and condiments.

4.23 EMERGING TRENDS IN SALADS

3.23.1 Trends from Japan

Everyone, at least once in a while, eats a depressing homemade salad, whether at their desk in work or from the confines of their own kitchen.

But a new cafe, in Naygowa, Japan, hopes that people would find a plate filled with wilting rocket and tomato slightly less depressing if it looked like a beautiful cake.

Fig 4.08: *Examples of Salad Cakes from Japan*

Food stylist Misuki Moriyasu first came up with the idea for so-called salad cakes (which are basically salads that look like cakes), and her idea has been so popular that a cafe selling them, The VegieDeco Cafe, is slated to open this month.

How a salad cake works is that basically in lieu of traditional icing, the cakes are glazed with either tofu or cream cheese, before they are blended with vegetables to make them look like frosting.

The cakes may look devilish, but they are in fact extremely healthy - simply speaking, they are nutritious salads disguised as tasty cakes.

The cakes contain whole vegetables in them, while the 'sponge' part of the lunch is created using natural ingredients like soybean flour.

The so-healthy-it-hurts cafe is set to open on April 5, and it will feature a number of superfoods, including low carbohydrate ingredients and gluten-free items.

Little or no sugar is added to each salad and there is a focus on health and beauty, with roots and peels also thrown into the mix to maximise the health benefits of each dish.

While they are certainly beautiful, and there is an intricate level of attention to detail in every single salad available, these cakes may fall short of your regular sweet batter, if you're expecting them to deliver a typical cake-y sugar rush.

However, they are a new, and nutritious way of pepping up your normally boring midday meal. And best of all, unlike their chocolate counterparts, they come guilt free.

Fig 4.09 : *Salad Cake is a new trend in Japan.*

Following a seasonal menu, the VegieDeco cafe is sure to become a favourite haunt of the health-conscious in Japan in days to come.

CHECK YOUR PROGRESS

1. Who invented the concept of salad cake?
2. Which brand is aggressively marketing the concept of salad cake?
3. Find out from internet resources the recipe for making Salad Cake

3.23.2 Trends from Britain

Salad is firmly in fashion in UK. Rather than a meal accompaniment as earlier, it is often taking centre-stage as a main meal in itself because consumers want salads that are filling, healthy and delicious. Let us see the world from the point of view of the customer.

'Walking in the shoes of the consumer'

There are two approaches in researching; one, find the need of the customer (Feedback Research) and how to fulfill those wants and needs (Design and Development).

The Feedback Team constantly interact with consumers using in-depth research from focus groups to immersion studies and online surveys. All this research helps to create a rich picture of the consumer, what they want from their salads, when they want it, where they get it and how they consume it. This process may be called 'walking in the shoes of the consumer'.

The Design and Development team, on the other hand, takes the feed from the Feedback team and designs new salads often using new ingredients and flavor combinations, which can be incorporated into new product ideas.The new product concepts, are then trialled and tested with consumers to see if they genuinely meet the needs identified by the Feedback Team. This whole process is institutionalized in the industry house as a quest of quality on continuous basis.

Forecasting tomorrow's salad

As results of these exercises we can chalk out the salad trends of the future. It is found that today's consumers want inspiring combinations to make their salad a complete meal. It include pasta, grains, nuts and pulses or ideas to transform their bags of salad or salad bowls into a tasty meal. Protein is a big trend that is likely to continue and protein-based salad meals are and will be very popular. Consumers want products that deliver on taste, health and convenience without breaking the bank.

These trends in salad mean that salad based products are now found throughout a shop from the fresh produce section to areas that traditionally were dominated by cold meals like quiche, sausage rolls and sandwiches. Salad products have to stand out on the fixture, offer something different and hold their own against these convenient food competitors.

The consumers of the day give importance not only to what the salad contents but also packaging innovations too from re-sealable lids to easy to open packaging for quick access to their salad meal, particularly if eaten on the go. For consumers who have packed time schedules, they also want to be able to see at a glance what goes with their meal, from dressings to additions like croutons or chia seeds. The Feedback team found that the consumers want a robust and "fit for the purpose" fork in the salads packings.

The recent studies also point out that the health conscious customers are giving a lot of importance to quinoa and other types of grains. It is because these add proteins to the salad. As noted earlier, it is a very important trend that the customer want their salad to be rich in protein. Due to this the british farmers are now looking to quinoa as a potential mainstream crop.

Fast assembly salad kits

The feedback team observes that there is a move towards salad bowls and trays. Generation Next prepare meals two or three times a week only. They therefore want a healthy salad that has variety and is quick and easy to prepare.

This need has given rise to kits that combine leaves, croutons, parmesan shavings and dressing . It allows the consumers to either eat the salad on its own or pop a piece of grilled chicken or fish on top. It was found that this kind of product is also perfect for the older generation who may live on their own and just want to buy enough salad for one meal.

New flavors

The research shows that younger generations are looking for more intense flavors and different textures. '*Kale'* is a good example of an on-trend ingredient that's hit mainstream retail in a big way – in bags, bowls, side salads and increasingly in Food To Go products. Pungent herbs, edible flowers, leafy spices and exotic South American flavors are hot on the heels of kale for providing excitement for today's adventurous consumers.

Looking to the future

The research teams expect that the prepared salads of the future will continue to include more grains, pulses, pasta and rice. It is also likely that the future trend will include products that allow consumers to create their own variety, by picking a dressing or different elements of the salad that the consumer simply has to assemble.

CHECK YOUR PROGRESS

1. What is the task of Feedback team and that of Design and Developemnt team?
2. Which are the important concepts in trends of salad content?
3. What features do the consumers look in the packaging of the salads?

4.21 SUMMARY

We have learned the following:

- Stocks contain: a major flavoring ingredient, liquid, aromatics, and mirepoix:
    - The major flavoring ingredient have bones and trimmings for meat and fish stocks and vegetables for vegetable stock.
    - The liquid most likely is water.
    - Aromatics include herbs, spices, and flavorings that create a savory smell; these include bouquet garni.
    - Mirepoix is a mixture of coarsely chopped onions, carrots, and celery which is used to flavor stocks, soups, and stews.
- Th following are the types of stock:
    - **White stock:** it is clear, pale liquid made by simmering poultry, beef, or fish bones.
    - **Brown stock:** It is amber liquid made by first browning/roasting poultry, beef, veal, or game bones.
    - **Fumet:** made with fish bones.
    - **Court bouillon:** It is an aromatic vegetable broth.
    - **Glace:** A reduced stock with a jelly-like consistency, made from brown stock, chicken stock, or fish stock.
    -
- When using bones for stock, they should be cut to the right size and prepared by blanching, browning, or sweating.
- There are five classical grand sauces that are the basis for most other sauces. They are béchamel, velouté, brown or *espagnole* sauce, tomato sauce, and hollandaise:
    - Béchamel, the base for cream, cheddar cheese, soubise
    - Veal velouté, the base for *Allemande*, Hungarian, curry
    - Chicken velouté, the base for mushroom, supreme, Hungarian
    - Fish velouté, the base for white wine, bercy, herb
    - Brown or espagnole, the base for bordelaise, *chasseur*, lyonnaise, Madeira
    - Tomato, the base for Creole, Portuguese
    - Hollandaise, the base for béarnaise, *Maltaise*
- Thickeners, such as roux, *beurre manié*, slurry, and liaison, are required to make the sauce stich to the food.
- There are other sauces that are not classified as grand sauces or as derivatives of grand sauces. These include compound butters, salsa, and coulis. In addition, some sauces are made with the natural juices from meat, such as *jus-lié* or au jus.
- We should match sauces to the type of food you are serving. Consider factors such as the main ingredient of the dish and how the flavors will complement each other.
- There are two basic kinds of soup—clear and thick. Clear soups include flavored stocks, broths, and consommés, and comprise soups such as chicken noodle soup and French onion soup. Thick soups contain cream and purée soups, such as bisques or cream of tomato soup.
- Stock or broth is the basic ingredient in clear soups. **Consommé** is a rich, flavorful broth or stock that has been clarified. It should be clear, aromatic, and highlight the flavor of the major ingredient.
- Cream soups are made with a thickener, such as roux. The main flavor in cream soups should be the major ingredient. For example, the main flavor should be shellfish for a bisque,
- The main difference between a purée and cream soup is that cream soups are generally thickened with an added starch. **Purée soups** are thickened by the starch found in the puréed main ingredient (such as potatoes).

- There are many unusual kinds of soup, including cold soups, such as fruit soups, such as winter melon; and vegetable-based soups, such as minestrone, gumbo, or borscht.

4.22 END QUESTIONS

1. Describe what is meant by the term “stock”.
2. Classify stock
3. Describe the uses of stock
4. Discuss how the stock is prepared
5. Explain what is meant by the term “sauce”
6. Discuss how sauce is classified
7. Discuss what is meant by thickening agenets and how they are used.
8. Explain the process of preparation of mother sauce.
9. Discuss what is meant by the derivatives of sauce.
10. Describe the properties of sauce.
11. Describe the process of preparation of sauce
12. Explain what makes a sauce a good quality sauce
13. Discuss the emerging trends in sauce
14. Explain what is meant by the term “soup”
15. Discuss how soup is classified
16. Describe the salient features of soup.
17. Describe the process of preparation of soup.
18. Explain what cares and precautions are to be taken while preparing soup
19. Discuss the emerging trends in soup.
20. Describe the concept of “Salad”
21. Discuss how Salads are classified
22. List various types of salads.
23. Describe the process of preparation of a salad.
24. Discuss the emerging trends in salads.

4.23 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress -1: (B)

Check Your Progress -2: (D)

Check Your Progress -3: (C)

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