UNIT - II

Introduction to ingredients used in preparation of bakery products:-

Bakery ingredients have been used since ancient times and are of utmost importance these days as perhaps nothing can be baked without them. They are available in wide varieties and their preferences may vary according to the regional demands. Easy access of global information and exposure of various bakery products has increased the demand for bakery ingredients. Baking ingredients offer several advantages such as reduced costs, volume enhancement, better texture, colour, and flavour enhancement. For example, ingredients such enzymes improve protein solubility and reduce bitterness in end products, making enzymes one of the most preferred ingredients in the baking industry.

Flour :- Flour is the major ingredient in making bread. It provides the structural framework of the bread because it contains gluten, which gives the bread strength to keep its shape when baking.

Composition:-

1. Carbohydrate 95 %
2. Proteins 5 %
3. Minerals 3%
4. Vitamins 1 %
5. Water 1 %

Gluten content:-The insoluble proteins, gliadin and glutenin form a rubbery material when water is added with flour. So when it is Kneaded well, the rubbery material (texture) developed is called gluten. It gives structure to the baked products. While gliadin gives extensibility, glutenin gives strength and holds gas during baking. The quality of flour is decided by the gluten content. If the gluten content is more, then the flour will be suitable for high structured products like bread. This bread –making flour should have the gluten from 10% to 11.5%.

Types of Flour and their utility

Types of flour: Bakers use two primary types of white wheat flours– hard flour or strong flour and weak flour or soft flour. We get hard flour from hard wheat. It contains 11.2 - 11.8% protein, 0.45 –0.50% ash, 1.2% fat and 74 –75% starch. The higher protein found in strong flour indicates a higher level of gluten. This type of flour is mainly used for high–structured products like yeast products like yeast products, choux pastry and puff pastries. We get

soft flour from soft wheat. This type of flour contains 8.4 –8.8% protein, 0.44 –0.48% of ash, 1% fat and 76 –77% starch. Due to the less protein content, this flour is mainly used for low –structured products like biscuits, cakes, sponges, short and sweet paste. Apart from the above flours, there are other types of flour and they are classified according to their extraction rate. Some of them are given below.

Salt use and effect :- These are chemical compound (other than water) formed by a chemical reaction between an acid and a base. Salt for human consumption is produced in different form sun refined salt (such as sea salt), refined salt (table salt), and iodized salt. It is a crystalline solid, white, pale pink or light gray in color, normally obtained from sea water or rock deposits. Edible rock salts may be slightly grayish in color because of mineral content. It is essential for animal life in small quantities, but is harmful to animals and plants in excess. Salt is one of the oldest, most ubiquitous food seasonings and salting is an important method of food preservation.

Uses of salt in bakery –

1. Acts as preservative, as it acts on microorganisms, extracts the liquid from them and then kills them.

2. Acts as anti –raising agent – regulates the leavening processes in breads by controlling the action of yeast.

3. Salt slows down all the chemical reactions that are happening in the dough, including calming fermentation activity to a steadier level.

4. Salt also makes the dough a little stronger strengthening effect on the gluten protein in the dough.

5. Salt adds flavor to baked goodsand mask the off –flavours. It also potentiates the flavor of other ingredients, including butter and flour.

Fat and oil

In the form of oil, butter, margarine, or shortening, is added to enrich the dough and to keep it soft. It gives the bread a moist crumb with a soft crust.

Sugar

Sugar or as it is chemically called Sucrose is a building blocks of carbohydrates and it is naturally found in many food such as fruit, milk, vegetables and grain, another kind of sugar is added sugar which can be founded in flavored yogurt, sweetened beverages, baked goods and cereals, and it is used widely in industry. Sugar is one of the major ingredients in the bakery industry and plays an important role. Sugars vary in their sweetening quality and

are the soul of all desserts. Sugar is natural and non –toxic, sweet testing, water soluble concentrated form or crystalline carbohydrate.

Uses of Sugar –

• Adds sweetness and flavour to the products.

• To colour the cooked products by the process of Caramelization.

• They give crust color. And help get even texture.

• Makes the texture firm and tender by weakening the gluten strands.

• To retain moisture and prevent in particularly baked goods such as cakes from drying out.

• Act as preservative.

• To help as an activator, sugar helps yeast to grow faster by providing it with a readily available source of nourishment.

• As anti –coagulant.

• They act as creaming agents with fats and as foaming agents with eggs.

• As a main ingredient for cake decorating, e.g. different types of icing (topping the cake).

Moisturizing agents

Agg The egg is a biological structure intended by nature for reproduction. It protects and provides a complete diet for the developing embryo, and serves as the principal source of food for the first few days of the chick's life. The egg is also one of the most nutritious and versatile of human foods.

Function of eggs in Bakery: Eggs perform the following functions in baking –

• Structure – Like gluten protein, egg protein coagulates to give structure to baked products. This is especially important in high –ratio cakes, in which the high content of sugar and fat weakens the gluten. The dish must maintain that structure throughout the baking process. Some foods, like soufflés, will deflate soon after cooking as the air in them escapes, but other dishes, such as cakes, remain light and tall long after you remove them from the oven. Egg whites can be whipped to create egg white foam. This foam is

filled with tons of air which helps to lighten and leaven baked goods.

• Emulsifying – Egg yolks contain natural emulsifiers like lecithin in the yolk and albumin in the whites that help produce smooth batters. Lecithin covers oil particles to keep them from gathering together once in the water – based mixture. By preventing the oil from clumping back together, the emulsifier prevents the finished product from separating. This action contributes to volume and to texture. Typical examples of emulsified mixtures are mayonnaise, salad dressing, baked goods, and ice creams.

• Leavening – Beaten eggs incorporate air in tiny cells, or bubbles. In a batter, this trapped air expands when heated and aids in leavening. For instance, the airy texture of an angel food cake would be impossible without the leavening of the beaten whites. For maximum leavening power, use room temperature egg whites, pristine bowls and beaters without any grease, and a small amount of acid to stabilize the whites.

• Tenderizing – Gluten is a protein in the flour of baked goods. The long strands of gluten contribute to chewiness in finished products. Flours with higher gluten percentages have chewier textures, such as bread flour, whereas those with low protein content, such as cake flour, produce more tender products.

• Shortening action – The fat in egg yolks acts as a shortening. This is an important function in products that are low in other fats. When added to baked goods, the fat from yolks shortens the recipe's gluten strands, yielding a more delicate, toothsome result.

• Moisture – Eggs are mostly water. Moisture in baked goods prevents the products from going stale while improving the flavor and texture. Fats act as moisturizers in food, which the yolks contain. The proteins found in both

the yolks and whites also contribute to holding moisture from the yolks in the finished goods. This moisture must be calculated as part of the total liquid in a formula. If yolks are substituted for whole eggs, for example, or if dried eggs are used, adjust the liquid in the formula to allow for the different moisture content of these products.Yolks also helpin binding ingredients together.

• Thickening – Eggs are valuable thickeners in the cooking of chiffon pie fillings and custard.

• Wash – Many types of bread use a wash to create a protein –rich coating that repels excess moisture while giving the loaf a shiny finish. Some foods that have toppings will use a wash of egg whites and water to hold the seeds, nuts, or grains in place during baking.

• Flavor – Without the richness of yolks, the tastes naturally in baked foods would not stand out as much. Eggs contribute flavor to baked foods.

• Color – Yolks impart a yellow color to doughs and batters.The carotenoid xanthophylls gives the yolks their distinctively bright color. Additionally, eggs also facilitate the Maillard reaction that occurs when proteins cook and brown. This browning occurs both in foods as well as on the surfaces of baked goods forming brown crusts.

Milk Milk may be defined as the whole fresh lacteal secretion obtainedby the complete milking of healthy animals excluding that from the animals that are within 15 days or after 15 days of calving.

Role of water in Bakery:

• Interaction with flour- Gluten development, combine all ingredients together

• Major requirement for enzymes to activate and work with flour components, maintain dough viscosity andconsistency

• Temperature adjustment of dough and batter

• Medium for leavening agents. Carbon dioxide produced by yeast during fermentation is dissolved into waterpresent in dough phase. Which expands during fermentation and gives porous texture to final product.

• During baking, key transformation such as gelatinization and gluten coagulation happens due to presence ofwater.

• Water plays crucial role in organoleptic quality. High moistness in bread indicates fresher product.

• In cookies & biscuits, moisture content usually below 5% to keep product crispy.

Fruits and nuts

A variety of dried and preserved fruits and nuts can be used in baked products to produce different types of flavours and finishes.It is usually necessary to wash dried fruits before use with a liberal amount of water and swirled around for about one minute. Care must be taken so that the fruit does not absorb too much water and become soft. If fruit absorbs too much water it will break down during mixing and discolour the dough. The flavour also diminishes if the fruit is soaked too long. After washing the fruits should be drained in sieve. After draining the fruits should be carefully picked over by spreading the fruit on a dry cloth to remove the excess moisture. The fruit should always be added last to ensure even distribution throughout the batter / dough with minimum damage.

Yeast

$C_6H_{12}O_6 \rightarrow 2CO_2 + 2C_2H_5OH$

yeast acts on sugars and changes them into carbon dioxide gas and alcohol.

•Fermentation activity of yeast is made possible because of the combination of various enzymes present in its cytoplasm like:

▫ Invertase: convert sucrose into dextrose and fructose.

▫ Maltase: convert maltose into dextrose

▫ Zymase: convert dextrose into CO_2, alcohol. And other substances which give the flavour to the product.

▫ Protease: mellow the flour protein and give better stretch ability to acquire volume and form structure.

Yeast is sensitive to temperature

Cakes/Bread making

Cake

Cake is a type of sweet food that is typically baked, made from flour, sugar, and other ingredients.

Flour, sugar, eggs, butter or oil or margarine, a liquid, and leavening agents such as baking soda or baking powder are the most widely Whipping Cream:

Raw Material

The raw materials required for Cake is as follow:

• Baking Powder

• Castor Sugar

• Eggs

• All Purpose Flour (Maida)

• Corn Starch

• Oil

• RO Water

Whipping Cream:

• Whipping Cream

• Icing Sugar

Decoration, Icing & Soaking: (Optional)

• Pineapple Juice

• Chopped Canned Pineapples

• Canned Cherry

• Usually, a traditional cake recipe contains flour, a kind of sweetener, eggs, some sort of fat, a liquid, a leavening agent to make it rise and flavour (like vanilla, cocoa powder or cinnamon).

 The key instigators of cakes being their own category (separate from breads)

were leavening agents, as these allowed baked products to grow literally.

 To enhance texture, moisture and overall flavour, a fat source is commonly

used. Essence

Manufacturing Process:

 Mixing (hot/cold process)

In the drum of the batter mixing machine, all raw materials are added in the amount needed

according to the required sequence.

 Depositing

The baking tray is appropriately greased with oil and a butter paper of appropriate shape i.e.

shape of the bottom is placed at bottom of the tray

 Baking

• Bake at 360–425°F (182–218°C) to an internal temperature of 204°F (95°C).

• The hot processed batter should have a shorter baking time.

 De-panning

• De-pan from the oven onto dusted paper pan liners while the cakes are still warm.

 Cooling

• Cool product to loaf internal temperature of 95–105°F (35–40°C) before icing and packaging.

 Icing

• Simultaneously Whipping Cream and Icing Sugar are beaten by a

simple beater until sufficiently stiff, which is then fed to holding tank of

cake decorating machine.

 Storage and Packaging or serving

• When all layers are added, the last layer is filled with only one layer of

whipping cream and then easily decorated by the machine, then finished manually

Bread

The knowledge of Bread making dates back to several thousands of years. Over

the years, Bread making method has evolved, to meet the production and qualityrequirements from time to time. While the conventional methods of bread makingare still popular, technological advancements during the last about fifty years havehelped to develop new methods which are gaining wide acceptability in differentparts of the world and also in our country,

Steps

Sifting

Th is isthe initial step where sifting of flour is done to remove any foreign materialsthat might be present in the flour. The sifting step also help to aerate the flour.

2 Preparation of Dough

The next step is preparation of dough. There are different methods of preparation ofdough, which involves either Mixing alone or Mixing and Fermentation. The doughpreparation stage is a very important step in bread making and the different methodsof dough preparation are generally referred to as different methods of Bread Making.We will discuss about this in more details, later.

.3 Dividing

The prepared dough isthen taken for dividing into pieces of required size. Dividing is done either manually or using dividing machine.

.4 Rounding and Intermediate Proof

After dividing, the dough pieces are rounded, to ball shape. The rounded doughpieces are passed in to the interproofer. Here the dough pieces get time to recovertheir extensibility so that they can be moulded without breaking the surface'skin toavoid stickiness and to get proper moulding. These two stages are usually by passedwhen dough is manually divided.

.5 Moulding

Here, first of all the dough issheeted by passing through set of pairs of rollers.Sheeting is done for expulsion of the trapped gases produced during the previousstages of processing The sheeted dough is then passed through a pressure boardduring which they get moulded to cylindrical shape.

6 Panningg

At this stage, the moulded dough pieces are placed in to the bread baking tins,

which are greased properly with refined oil or emulsion. Panning is done in such away that the dough pieces are centrally placed in the tins with the seals facing bottom. This will prevent subsequent opening of the sealed dough during flnal proofing.

6.2.7 Final Proofing

The panned dough pieces in baking tins are then transferred into Final Proof er. The Final Proof er is a closed chamber, where the required heat and humidity are provided for fast rising of the dough in the tins without surface drying. Final proofing takes normally about 50-60 mins. During the Final Proofing the panned dough pieces gradually rises inside the baking tins due to gas produced by yeast action and by the end of this stage, the dough pieces rises to the required level.

8 Baking

The fully proofed dough pieces are then transferred to baking oven. When the

dough pieces enter the oven after final proofing, the activity of yeast still remain for a short period and at a faster rate due to increasing temperature, The dough pieces increase in volume rapidly because of an increase in the rate of release of CO_2 and gas expansion. This rapid increase in the volume is known as Oven spring. Asbaking proceeds yeast get deactivated, the proteins get coagulated, starch gelatinises and set the structure of the product after which there will be no further increase in volume. Towards the end of baking golden brown colour develop on the top and sides of the bread. High temperature short time baking is considered ideal for getting soft bread. The normal baking temperature ranges from 220-260 degree Celsius, depending on the size and variety of bread

.9 De-Panning and Bread Cooling

Once the breads come out of the oven, they are de-panned and are stacked on

trolleys. For the purpose of slicing and wrapping, loaves must be cooled. Faster

cooling can be achieved by forced circulation of air over the loaves. At the end of

the cooling process, the temperature of the interior of the loaf shall be nearer to the room temperature. The humidity of the air in the cooling may be controlled to prevent excessive moisture loss from the surface.

10 Slicing and packing the sufficiently cooled breads are sliced and packed in polypropylene pouches.

Method of bread making

As mentioned before, there are different methods of Bread Making (ie. methods of dough preparation). These can be broadly grouped into three based on the way the dough is prepared.

1. Conventional (Bulk Fermentation) Dough Development methods

2. Mechanical Dough Development Methods

3. Chemical Dough Development Method

Fault in the Bread and cake making and their remedi

Too much Volum

Possible Cause	**Possible Solution**
Too much yeast	Check yeast quantity
Over proofed	Final proof too high
Over scaled	Check scaling weigh Incorrect amount of concentrate

Badly Shaped

Possible Cause	**Possible Solution**
Moulder settings too loose	Check moulder settings
Dough placed wrongly in tin	Check dough placement in tins
Poor hand moulding	Mould dough evenly
Tight dough	Increase water quality
No intermediate proof	Rest dough for 10 min after scaling

Lake of Crust Colour

Possible Cause	**Possible Solution**
Baking temperature too low	Increase baking temperature
Baking time too short	Extend baking time
Inconsistent oven heat distribution	Check oven elements

Too little concentrate	Check recipe and scales

DRY, CRACKED TOP CRUST

Possible Cause	**Possible Solution**
Proofer too dry	Check proofer settings
Dough left outside to skin	Place trolley in proofer after moulding
Under baked	Extend baking time

HOLES IN BREAD

Possible Cause	**Possible Solution**
Too much dusting flour on table	Reduce dusting flour
No intermediate proof	Rest dough for 10 min after scaling
Too much flour in final moulder	Refrain from using flour in moulder
Poor hand moulding technique	Ensure proper moulding
Proofer too hot	Reduce proofer temperature to 40°C

POOR OVEN SPRING

Possible Cause	**Possible Solution**
Dough temperature too high	Decrease dough temperature
Under mixed	Extend mixing time
Proofer too hot	Set proofer to 40°C
Over proofed	Check final proof
Dough left for too long on table	Reduce resting time

POOR RETARDING

Possible Cause	**Possible Solution**
Dough dried out in fridge	Use the trolley cover
Dough temperature too high	Reduce dough temperature
Fridge temperature too high	Ensure fridge temperature is between 3°C - 5°C
Dough left in fridge for too long	Reduce refrigeration time

COLLAPSED BREAD

Possible Cause	Possible Solution
Slack dough	Reduce water quantity
Under mixed	Increase mixing time
Over proofed	Ensure correct final proof
Too little yeast	Check yeast quantity
Bumping the trolley after final proof	Ensure smooth transfer from proofer to oven

BREAD STICKS IN TIN

Possible Cause	Possible Solution
Under baked	Extend baking time
Tin not greased sufficiently	Check tin oil application system
Slack dough	Reduce water quantity
Too much steam in proofer	Check proofer steam settings
Poor quality or separated tin oil	Change tin oil

Pastry making THE TERM PASTRY comes from the word paste, meaning, in this case, a mixture of flour, liquid, and fat. In the bakeshop, pastry refers both to various pastes and doughs and to the many products made from them.

Pastry making principal Principles of pastry making

• Good mixing technique is the basis of good pastry.

• Majority of the pastry dough's need cool conditions. Strudel and hot water paste require warm conditions.

• The ratio of flour to fat depends on the type of pastry.

• It is important to have the correct amount of liquid for mixing. The amount of water should be adjusted according to the different types of flour.

• Dough's need resting and they should be allowed to relax after rolling.

• Do not turn the pastry over but turn the pastry around.

• When baking, ovens must be always preheated to the correct temperature before placing any pastry in the oven.

Types The basic ingredients are the same for all pastries but the difference is between the amount of fat and the method of incorporating fat.

1. Short crust pastry

2. Choux pastry

3. Hot water crust pastry

4. Puff pastry

5. Flaky pastry

6. Rough puff pastry

7. Danish pastry

8. Filo / phyllo pastry

Methods

Air, incorporated during making, expands on cooking.

The expanding air stretches the gluten in the flour.

The fat melts.

The starch grains in the flour swell and gelatinise in the heat and absorb the fat and some of the water.

The gluten coagulates and sets the framework of the pastry.

The surplus water evaporates.

The starch grains on the surface become dextrinised in baking, thus giving a brown colour to the pastry. Amino acids and sugars also react to form brown products, via the Maillard reaction.

If the oven is too cool that fat will melt before the starch gelatinises and the fat will run out.

Biscuit and cookies Cookies are often referred to as small, sweet cake items. They are very similar to cakes in the type of ingredients used and the method of mixing them. They differ from cakes in the proportion of ingredients and panning method. The primary

difference between cookies and cakes is the amount of moisture in the mixture.
Ingredients Used and their functions:

1. Flour – Flour used for cookies is slightly different from bread and cake flour. Flour used for cookies should constitute 7-8% of gluten. This is also known as soft flour and is low in strength; higher percentage of gluten is not suitable for cookies. To make flour suitable for cookies or to reduce the strength of flour, corn starch can be added. Cookies which have a higher fat content require strong flour so that they do not spread too excessively and retain their shape. The flour should be free from any impurities and bad odour and should be shifted to incorporate air. This also makes the mixing operation easier.

2. Egg - Eggs are used as both tenderising and toughening agents for cookies. Egg yolk contains a large amount of fat, which is known as lecithin. Lecithin helps to tenderize the cookies. Eggs also impart flavour and taste to the cookies. Eggs are beaten till they are foamy, which increases the volume of the egg and results inthe coagulation of the protein in the egg white. This gives structure to the cookies. Eggs that are used in making cookies must be fresh since older eggs give off flavour. This has an adverse effect on cookies.

3. Shortening - Shortenings include hydrogenated fat, butter and margarine. They give tenderness and softness to cookies. When it is beaten, air cells are incorporated and help in giving softness to cookies. Butter is considered as a good shortening for its moisture content and flavour.

4. Milk - Generally, milk powder is used while making cookies. It is significant to mix and sieve milk powder with dry ingredients so that it does not form lumps. Milk gives good flavour. It is an emulsifying agent and helps in making fat and protein emulsion. Casein and albumin present in milk act as a jellying agent.

5. Sugar – Sugar gives a sweet taste and when it caramalizes, it gives colour and flavour to the cookies. Apart from contributing to sweetness, sugar also imprts volume. Ground sugar or castor sugra includes small particles which does not mix properly and will leave crystals having an adverse effect on the creaming process. Honey is used to obtain a particular flavour and also provides a chewing quality to the cookies. Honey has moistyre in it, and provides a soft and crispy texture to cookies.Molasses is also used to add flavour to cookies.

6. Chocolate and cocoa powder - Chocolate is obtained from the cocoa beans. Chocolates are available in many forms and varieties including white chocolate,Some natural products like cocoa powder and vanilla extract are also used. Artificial butter and milk flavour are used and make sure that these should be used in less amount otherwise it may develop a

bitter taste to the product. Vanilla flavour is the most commonly used ingredient in baked products. It is available as both liquid as well as powdered form.

12. Colors: only permitted colors should be used for making cookies. For biscuits and cookies, a golden brown color is always preferred, because it is the natural color of cookies.

13. Baking soda (Soda-Bi-Carborate): When moisture and acid are present, soda releases carbon-di-oxide that leavens the product. Acid ingredients that react are honey, molasses, butter milk, fruits, cocoa powder and chocolate etc.

14. Baking Powder: It is a mixture of soda and an acid to react with. They do not depend on acid ingredients in the formula.

15. Baking Ammonia: It is chemical ammonium carbonate. It de composes during baking to release CO2. Only heat and moisture is required for it to work.

CLASSIFICATION OF COOKIES/BISCUITS

Cookies may be classified into the following categories:

1. **Drop cookies**: Also known as batter type cookies, they are quite similar to the cake, except that the cookies batter has less eggs, water and milk. Drop cookie contains a high amount of fat, resulting in the smooth and soft consistency of batter, so that it can easily pipe out through the nozzle. Drop cookies are soft and moist when baked. The consistency of the batter of drop cookies is thicker than cake batter and slightly more liquid then bread dough. Coconut cookies, peanut cookies and walnut cookies are examples of drop cookies.

2. **Rolled Cookies**: Rolled cookies have very little or no liquid. Sometimes they are referred as rolled biscuits. They are crisp and usually made from mixture that is rich in fat or sugar or both. Dough for rolled cookies is usually soft and can be rolled easily. Stiff dough is difficult to handle and gives dry compact cookies. The rolled dough can easily be cut into different shapes and sizes. Rolled cookies are also known as sheeted cookies because dough can be rolled in the form of a sheet. Chocolate biscuits, ginger biscuits, sweet and salty biscuits etc: come under this category.

3. Foam Cookies: Foam cookies are made with a large percentage of egg white, which provides structure as well as leavening action. The foaming method is used in making these types of cookies; the foam of egg white is made by beating egg white to a stiff stage. Then, sugar is added gradually and beating is continued. When beating is complete, coconut or other ingredients may be added. Macaroons and meringues are examples of foam type of cookies.

Methods Different methods used and examples Mixing methods for cookies is similar to that for batter cakes. The primary factors in making a quality cookie are proper mixing and temperature control. Although cookie dough is often chilled after mixing to facilitate shaping, the ingredients should be approximately 65 – 70 degree Fahrenheit when mixing.

1. Creaming Method: The conventional or creaming method is one of the most commonly used for cookies. Cookie dough should be mixed just enough to blend the ingredients thoroughly. The longer the creaming of the shortening/ fat and the sugar, the less spread the cookie will have due to dissolving of the sugar crystals. Under creaming, will give the cookie a coarse structure and will result in a baked product that has spread. Once creaming is complete, flour is added to the mixture. Over-mixing develops the gluten in the dough and retards the spread of the cookie.

2. One Stage Method: This method is the counterpart of the blending or two stage method. Cake batters have more liquid so they must be mixed in two stages in order to blend uniformly. Cookies on the other hand can be mixed in one stage.

3. Sponge Method: This method is essentially the same as for egg foam method for cakes. Care should be taken when folding in the dry ingredients so as to deflate the batter. Cookies like Macaroons are made by this method. 3. Sponge Method: This method is essentially the same as for egg foam method for cakes. Care should be taken when folding in the dry ingredients so as to deflate the batter. Cookies like Macaroons are made by this method.