PROJECT REPORT

TRAINING at BISCUIT MANUFACTURING PLANT

DATE – 15th May to 14th June

RAJA UDYOG PRIVATE LIMITED

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PREFACE

The industrial training is the effort to produce link between the student and the industry in order to develop the awareness of industrial approaches to solve the problems based on the understanding of tools , plants and machinery process , mode of operation .

Having united our experience gained from the industrial training at ***Raja Udyog Private Limited*** . We have been written the report that attempts to combine theory and laboratory applications.

The 30 days training is a part of the post-graduate (M.Voc) curriculum. The training adapting ourselves to the industrial environment and understanding the limitation and the freedom under which the engineers work . The training involves the industrial work and knowledge about the food industry and to know about raw materials used in different products made in this industry . To gain the knowledge about all kinds of primary tests of raw materials and testing of the final products and the packaging materials .

INTRODUCTION

RAJA UDYOG PRIVATE LIMITED has been incorporated in 2001 with aim to take over the existing business of raja products . Raja Products had earned good brand image of it's brand **RAJA BISCUITS** and to cope with enlarge resources to expand the business of Raja food products .

RAJA UDYOG PRIVATE LIMITED with an aim of provide quality biscuits and to enlarge it's business all over Eastern India with in a span of 21 years , it has quietly emerged as a household in the whole country .

It is a private company and classified as Non-govt. company and is registered at Registrar of companies located in ROC - KOLKATA .

Main activity of RAJA UDYOG PRIVATE LIMITED is - Manufacture of biscuits , cakes , chips , beverages etc . and it comes under division Manufacture of FOOD PRODUCTS AND BEVERAGES and it comes under section MANUFACTURING .

Directors of RAJA UDYOG PRIVATE LIMITED are - Jay Gupta , Loknath Prasad Gupta , Omprakash Gupta , Pushpa Gupta , Sumitra Devi Gupta .

The great visionary along with a dedicated workforce and a dynamic team carried RAJA to a brand name to reckon with .

RAJA has quietly and calmly with it's good quality and affordable price has entered into each and every household of Eastern India and now need only it's name "RAJA" to recognize it's quality at every place .

Production Of Raja Golden Marie

Introduction :

A **Marie** is a type of sweet biscuit similar to a rich tea biscuit. This rich biscuit is the most popular version of tea biscuit. It is a low fat zero cholesterol

Ingredients :

Refined Wheat Flour (Maida), Sugar, Refined Oil, Invert Sugar Syrup, Raising Agents, Milk Solids, Iodised Salt, Calcium Salt, Ferrous Salt, Potassium Iodate; Natural and Artificial Flavour- Milk & Vanilla.

a) Refined Wheat Flour (Maida) -
Maida is a white flour from the Indian subcontinent, made from wheat. Finely milled without any bran, refined, and bleached, it closely resembles cake flour. Maida is used extensively for making biscuits , baked foods such as bread , pastries .

b) Sugar –
sugar is used in biscuits formulations in a granulated or powder form. Sugar gives sweetness , but it is also important in developing the texture of the biscuit and to enhance the browning reaction in the process. Dissolve sugar tends to inhibit starch gelatinisation and gluten formation and creates a biscuit with a more tender texture.

c) Refined oil –
In most cases , there used palm oil in the biscuits. The main function of liquid fats is to add richness and tenderness.

d) Invert sugar syrup -
The use of invert sugar is very common in biscuit making to make more moist and tender biscuit texture. Inverted sugar retains more moisture than sucrose and less prone to crystallization which yields the softer texture. Due to it's increased water retention property , it may also improve shelf-life by delaying staleness.

e) Raising agents –
Most common raising agents , used in biscuits are-

i. Ammonium bicarbonate
ii. Sodium bicarbonate

These are extremely useful leavening agents for biscuits because it decomposes completely when heated , breaking down into carbon-dioxide gas ammonia gas and water and thus leaving no residue in the baked biscuit .

f) Milk solids -

Milk solids refers to the dried powder left after all the water is removed from liquid milk , such as milk powder found in supermarkets . This helps to give nutritive value and to give biscuits their colour .

g) Iodized salt -

Iodized salt tightens the gluten structure which is crucial for yeasted dough products . The higher level of salt , the harder the dough becomes. The strengthening allows the dough to hold the carbon-dioxide produced during fermentation .

h) Calcium salt -

Calcium salt is used in the baking industry for many reasons , from an anti-caking agent to salt replacement . It is an inorganic compound with the formula $CaCl_2$. It is solid at room temperature but highly soluble in water . Calcium salt often exists in hydrated form.

i) Ferrous salt –

It is widely used in industries now days for fortifying the biscuits to decrease the rate of iron-deficiency level in people . The addition of this ferrous salt also helps to maintain the daily intake of iron .

j) Potassium iodate -

Potassium iodate helps to oxidize and strengthen gluten protein bonds in bread dough almost immediately after mixing . It also helps to accelerate the reactions which allow the bread to rise during mixing .

k) Natural and artificial flavour (milk & vanilla flavour) –

These flavours added in biscuits for making biscuits more tasty and flavourful .

Nutritional Value of the Product :

NUTRITIONAL INFORMATION (AVERAGE VALUE PER 100g)	
Carbohydrate	77.55 g
Protein	7.5 g
Cholesterol	0 mg
Fat	11.58 g
Mono unsaturated fatty acid	4.14 g
Poly unsaturated fatty acid	1.44 g
Saturated fatty acid	5.95 g
Trans fatty acid	0 g
Energy	448.4 k.cal

Processing Flowchart :

Sieving of raw materials

↓

Dough making and coming down in dough mixer

↓

Dough poured into dough van

↓

Dough comes to hopper

↓

Dough rolled in roller

↓

Layering it in laminator

↓

Putting it into Gaze Roller

↓

Putting it for some relaxation (for uniform baking)

↓

Spraying milk

↓

Moulding (cut in to proper shapes , rest of the dough went back to hopper)

↓

Into oven for baking

- Cooling
- Packaging in metalized foil

Process description -

a) Mixing and kneading - Weighed amount of sifted flour sugar shortening and flavouring agents are mixed in mechanical mixer. Water and baking powder are added during mixing to obtain a dough of desired consistency. Kneading for 10-20 min produces biscuits with fine structure smooth crust and better appearance.

b) Sheeting and shaping - The dough is then rolled into sheets of desired thickness by passing it through pairs of rolls. The sheets are then cut by mechanically worked stamped dividers fitted with dies.

c) Baking and cooling - The cut biscuits are then transferred to plate sheet or wire mesh bands travelling through ovens. The biscuits are generally baked at 450 degree f for 15 minutes and cooled to ambient temperature after baking.

d) Packaging - The biscuits should be packed in moisture and grease proof cellophane or metalized laminated foils.

Production of RAJA Big B Biscuits

Introduction :

Big B Spicy Cracker is **a spicy cracker biscuit**. They are perfect to enjoy with a hot cup of tea or coffee. These salt biscuits will take your snacking experience to a whole new level. Crispy, light and salty, this is a perfect cracker to satisfy your daytime hunger pangs.

Ingredients :

Wheat Flour (64.7%), Edible Vegetable Oils (Palm, Palmolein), Sugar, Raising Agents , Acidity Regulator , Edible Common Salt, Milk Solids(1.7%), Invert Syrup, Liquid Glucose, Malt Extract, Yeast, Spice & Condiments (Black Cumin, Cinnamon, Cloves, Reshmi, Ginger, Garlic, Dried Powder Vegetables), Dough Conditioner , Emulsifier , Improver

Nutritional value of the Product :

Processing Flowchart :

Sieveing of raw materials

↓

Dough making and coming down in dough mixer

Dough poured into dough van

Dough comes to hopper

Dough rolled in roller

Layering it in laminator

Putting it into Gaze Roller

Putting it for some relaxation (for uniform baking)

Spraying oil

Moulding (cut in to proper shapes , rest of the dough went back to hopper)

Into oven for baking

Detector (detect if there is any metal part in the biscuits)

Stacker

Broken biscuits are sorted and thrown away

Metalized Foil Packaging

Process Description -

a) **Mixing and kneading** - In this biscuits the same ingredients (wheat flour sugar oil salt leavening agents emulsifier etc) are mixed here But one ingredient is different for this biscuit which is condiment / spices

b) **kneading** - The dough is made up of kneading of 10-20 minutes which will give the product biscuits , fine structure and smooth crust and better appearance This needs a good amount of water

c) **Sheeting and shaping** – The dough is then rolled into sheets of desired thickness of rolls The sheets are then cut by mechanically worked stamped dividers fitted with dies .

d) **Baking and cooling** - The cut biscuits are then transferred to plate sheet or wire mesh bands travelling through ovens . The biscuits are generally baked at 450 degree F for 15 minutes and cooled to ambient temperature after baking . After baking , the Big-B biscuits are sprayed oil on them .

e) **Packaging** – The biscuits should be packed in moisture and grease proof cellophane or metalized laminated foils . Before packaging the broken biscuits are sorted by workers .

Process Description –

a) **Mixing and kneading** – In this biscuits , the same ingredients (wheat flour , sugar, oil, salt, leavening agents, emulsifier etc) are mixed here But one ingredient is different for this biscuit which is condiment / spices

b) **kneading** – The dough is made up of kneading of 10-20 minutes which will give the product biscuits , fine structure and smooth crust and better appearance . This needs a good amount of water .

c) **Sheeting and shaping** – The dough is then rolled into sheets of desired thickness of rolls . The sheets are then cut by mechanically worked stamped dividers fitted with dies .

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Process Description –

a) **Mixing and kneading –** In this biscuits , the same ingredients (wheat flour , sugar, oil, salt, leavening agents, emulsifier etc.) are mixed here. But one ingredient is different for this biscuit which is condiment / spices.

b) **Kneading –** The dough is made up of kneading of 10-20 minutes which will give the product biscuits ; fine structure and smooth crust and better appearance . This needs a good amount of water .

c) **Sheeting and shaping –** The dough is then rolled into sheets of desired thickness of roils . The sheets are then cut by mechanically worked stamped dividers fitted with dies .

d) **Baking and cooling –** The cut biscuits are then transferred to plate sheet or wire mesh bands travelling through ovens . The biscuits are generally baked at 450 degree F for 15 minutes and cooled to ambient temperature after baking . After baking , the Big-B biscuits are sprayed oil on them .

e) **Packaging –** The biscuits should be packed in moisture and grease proof cellophane or metalized laminated foils . Before packaging the broken biscuits are sorted by workers .

Laminated in a laminator

↓

Flour shifting on the dough

↓

Rolled in roller

↓

Milk spraying on the dough

↓

Moulding / cutting

↓

Baking in oven

↓

Cooling (sugar-free requires more time to cool than Marie Gold and Big-B Biscuits)

↓

Packaging

↓

Box carton (Bulk Carton)

Process Description

a) **Mixing** - The weighed amount of sifted flour, vegetable oil, raising agents (sodium and ammonium bicarbonate), salt are mixed in mechanical mixer. In this type of sugar free biscuits Isomalt and Maltitol (sweeteners) are used in replace of sugar (made of sugar cane).

b) **Kneading** - The dough is made by kneading of 10-20 minutes. Water is added at the time of kneading and it will give the biscuits a desired consistency, fine structure, smooth crust and better appearance. In case of this biscuit some flour is spread on the dough for making them more crunchy. Milk also sprayed on the dough for improving flavour of the product biscuits.

c) **Sheeting and shaping** - The dough is the rolled into sheets of desired thickness. The sheets are then cut by mechanically worked stamped dividers fitted with dies. This biscuit is mainly cut in square shapes.

d) **Baking and cooling** - The cut biscuits are then transferred to plate sheet or wire mesh bands travelling through ovens. The biscuits are generally baked at 450 degree F for 15 minutes and cooled to ambient temperature after baking.

e) **Packaging** - The biscuits are sorted and then should be packed in moisture and grease proof cellophane or metalized laminated foil.

Production of Golden Time Elaichi Biscuits

Introduction :

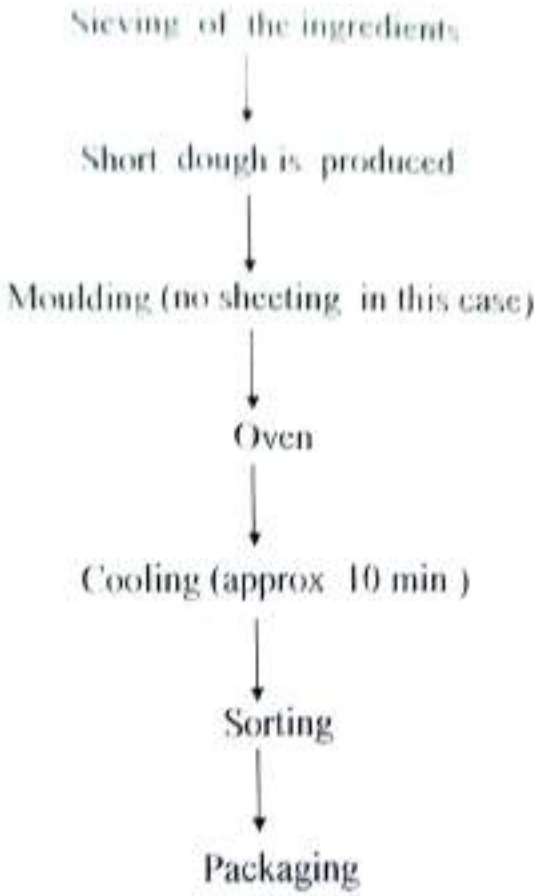
The pure elaichi flavour of real cardamom with the refreshing crunch of tasty biscuits. Spice up your life with the alluring taste.

Ingredients :

Wheat Flour, Sugar, Edible Vegetable Fats & Oils, Invert Syrup, Salt, Milk & Milk Products, Leavening Agents (E503 (Ii), E341(I), Cardamom, Edible Starches, Mono & Diglycerides, Soya Lecithin, Antioxidant.

Nutritional value of the Product :

Process Flowchart :



Processing description –

a) Mixing and kneading - The ingredients are same for this but the wheat which is needed in this case should be soft wheat (with low protein content such as 7-9%) . A low protein flour makes a dough with a much weaker gluten web by kneading for a little time The short doughs are short with higher fat and sugar content than the hard sweet biscuits and crackers .

b) Moulding – For this type of biscuit , moulding takes place only , no sheeting is done .

c) Baking and cooling – The mould is then baked and cooled for 10 minutes .

d) Packaging – After cooling , the produced biscuits are sorted and packed in metalized foil or grease packaging .

Production of RAJA Golden Baked (Butter Toast)

Introduction :

Toast is biscuits that has been browned by radiant heat. The browning is the result of a Maillard reaction, altering the flavor of the bread and making it firmer so that it is easier to spread toppings on it. Toasting is a common method of making stale bread more palatable.

Toast is commonly eaten with butter or margarine, or sweet toppings, such as jam or jelly. Regionally, savory spreads, such as peanut butter or a yeast extract, may also be popular. Buttered toast may also accompany savory dishes, especially soups or stews, and be topped with heartier ingredients like eggs or baked beans as a light meal. Toast is a common breakfast food. Bagels and English muffins are also toasted.

Ingredients :

Plain flour (maida), instant dry yeast, sugar, castor sugar, milk powder, cardamom (elaichi) powder, oil and salt.

Bread cut into pieces

↓

Sorting

↓

Baked again for less time

↓

Cooling

↓

Sorting

↓

Packaging

↓

Box carton

↓

Bring it to go-down

↓

Selling

Process description -

a) **Mixing and kneading** - First , all the necessary ingredients are mixed . In case of toast biscuits, plain flour or maida is used and dry yeast is very important ingredient in this . The mixture is kneaded through machinery .

b) **Moulding -** Here , bread moulder is used and the dough is moulded like a bread .

c) **First Baked and cooled-** The bread is baked for 20-25 minutes and the temperature should be 350 degree F. The bread is cooled for overnight on cooling-beds.

d) **Second baking –** The bread is cut into pieces and again baked in low temperature for less time .

e) **Cooling –** The baked bread pieces are cooled for 5-10 minutes .

f) **Packaging -** The cooled pieces got enough crunch and then these are packed in metalized foil and grease packaging .

Potato Chips:

Introduction :

A potato chip is a thin slice of potato that either deep fried, baked , or air fried until crunchy. They are commonly served as a snack, side dish , or appetizer. The basic chips are cooked and salted; additional varieties are manufactured using various flavouring and ingredients including herbs, spices, onion, lemon, cheese, other natural flavours , artificial flavours and additives.

Name of the product:

- Raja Potato chips; plain salted
- Raja potato chips ; mgjic masala
- Raja potato chips ; cream onion
- Raja spicy chips ; spices treat

Ingredients of potato chips:

Potatoes, edible vegetable oil, iodized salt, sugar, spices & condiments (onion powder, garlic powder, tomato powder, amchur powder, red chili powder, maltodextrin, class II preservatives, emulsifying and stabilizing agent, nature identical artificial flavouring substance).

Role of ingredients :

Role of potato :

- Major constituent of chips.
- A structure builder or binder that provides the basic framework in chips .
- Rich source of CHO, fibre .

Role of edible vegetable oil :

- Act as a shortening agent
- Edible oils are sources of dietary fat that play an important role in body , satisfying nutritional needs

Role of iodized salt :

- Helps to create salt.

Role of spice and condiments :

- Spice and condiments are used as flavouring agents and seasoning agents to enhance the flavour. Various types of condiments are used such as onion powder , garlic powder, tomato powder, amchur powder, red chilli powder, etc.

• Nutritional value of the Product :

Processing of potato chips:

Potato infeed elevator

↓

Grading & sorting

↓

Destoner (cleaning)

Peeler roller (peeling)

Potato sorting bed (defect potato analyzed)

Slice infield bed (with water)

CC filter

Slice washing drum (30 sec)

Slice washing shaker

Blancher (37 – 75 degree C)

Filter

Again shaker + air blower

High speed bed

Frying (175 – 185 degree C)

De – oiling bed

↓

Seasoning in rotating drum

↓

(Seasoning - salt/ spicy/ onion/garlic/ tomato powder.)

↓

Hopper

↓

Conveyor

↓

Bring the chips in full AC room (to keep the moisture intact)

↓

Bucket conveyor

↓

Chips weighing machine

↓

Chips packing machine

Preparation of potato chips in details:

Grading & sorting :

At first potato are placed in potato infeed elevator, then grading and sorting are done. After that stone and impurities are removed from potato and clean with water.

Peeling & rolling:

In this step potato are peeled and rolled, then placed in potato sorting bed , where defect potato are removed.

Blanching :

In this step potato slices are washing with water in washing drum and shaking by shaker , then blanching are done with sugar in blanchar machine at 75 - 75 degree C.

Frying :

Potato slices are frying at 175 - 185 degree C after shaking and air blowing through a high speed bed. Then fried slices are placed in a de - oiling bed , where excess oil are removed.

Seasoning :

After sorting the defect chips, various seasoning and flavouring substance are added into chips to enhance flavour.

Packaging :

After seasoning the chips are weighing and packing.

Stick chips:

Introduction:

Stick chips is a thin stick made of rice meal, gram powder, corn meal by roasting until crispy. They are commonly served as a snack side dish or appetizer. The chips are cooked and seasoned with various flavouring substance including spice extract, salt, lemon extract, vegetable powder, etc.

Name of the product

- Raja mast stickz , tomato twist
- Raja krinkle puff , mast masala

Ingredients of stick chips:

Rice meal, edible oil, corn meal, gram meal, salt , spice & condiments (spice extracts, salt, maltodextrin, class II preservatives , vegetable powder, food acids, emulsifying & stabilizing agent, nature identical artificial flavouring substance.

Processing of stick chips:

Mixing of rice , besan , corn in extruder

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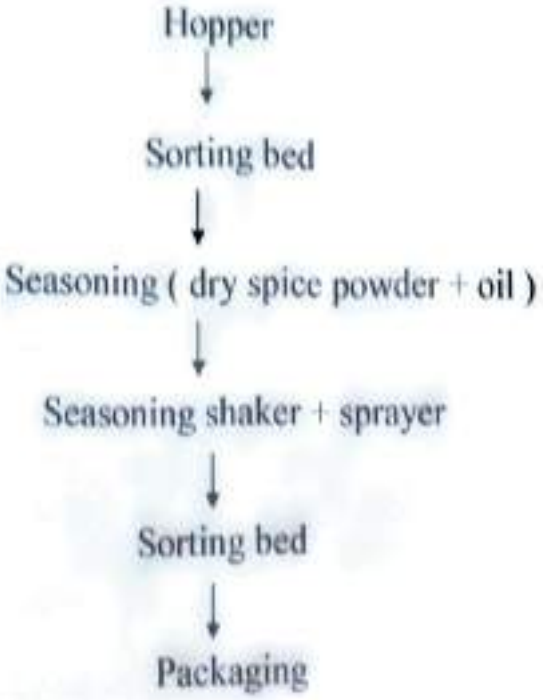
Roasted drum

↓

Infill bed

↓


Hopper
Sorting bed
Seasoning (dry spice powder + oil)
Seasoning shaker + sprayer
Sorting bed
Packaging

Mango juice:

Introduction :

Mango juice is derived from mango fruit, which grows on tropical trees that belong to the *Mangifera* genus . Mango juice is made by pressing or blending out the juice from the soft , orange pulp of mango to deliver significant amounts of vitamin C , vitamin A , potassium, iron, various carotenoids and potent organic acids in every bottle of juice . mango juice has been a part of the human diet for thousands of years.

Name of the product:

- Raja mango lip sip (available in bottle & tetra pack)

Ingredients of mango juice:

RO purified water, sugar, mango pulp, colour , additives, flavour , preservatives.

Role of ingredients of mango juice:

Role of RO purified water:

- It is the main constituents of mango juice
- Act as a lubricant
- Act as a temperature regulator

Role of sugar:

- Helps in crystallization
- Helps for making clarified syrup

Role of mango pulp:

- It is the another main element of mango juice.
- Mango pulp contains high pectin and needs pectinase treatment for clarification of the juice.

Role of additives:

- Colouring agents are used to create colour of mango juice.
- Various flavouring agents are used to enhance flavour.

Role of preservatives:

- citric acid and lemongrass essential oil are used as preservatives.
- These are used to preserve the juice from external contamination.

Role of emulsifier:

- To promote emulsion stability , stabilize aerated system, and control agglomeration of fat globules.
- To modify texture , shelf life , and rheological properties by complexing with starch and protein componants.

Nutritional value of the product :

Nutritional Information	
Per 100g (Approximate Values)	
ENERGY (Kcal)	250
PROTEIN(g)	0.90
CARBOHYDRATE (g)	71.59
OF WHICH SUGARS (g)	64.80
DIETARY FIBER (g)	1.05
FAT (g)	<0.1
SATURATED FAT (g)	<0.1
TRANS FAT (g)	<0.1
SODIUM (mg)	3.85

Processing of mango juice :

For bottle packaging :

Hot carbon treatment (sugar in water; activated carbon ; 85 degree C for 30 min)

Filtration

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Cooling (< 40 degree C)

↓

Clarified syrup

↓

Tank store

↓

Adding mango pulp

↓

Adding additives

↓

Adding citric acid

↓

Checking of brisk , acidity , pH value

↓

Ready for homogenization

↓

Pasteurization (96 degree C)

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Bottle filling

↓

Labelling

↓

Cooling

↓

Storage

For tetra packaging :

Same like bottle packaging till pasteurization

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Filling in tetra pack (already steriled with H_2O_2 in 121 degree C)

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Sealing with high pressure

↓

Cooling

↓

Marketing

Preparation of mango juice in details :

Hot carbon treatment :

At first sugar are added into RO purified water with activated carbon at 85 degree C for 30 min, then filtered and cooled , and turn into clarified syrup.

Adding mango pulp :

In this step mango pulp are added into clarified syrup, then additives and preservatives (citric acid) are added.

Testing :

In this step brix value , acidity level , pH level are checked foe quality improvement.

Homogenization & pasteurization :

Mango juice are homogenized and then pasteurized in 96 degree C .

Packaging :

In this step bottle are filled with mango juice and labelled, then bottles are cooled and stored for marketing.

QUALITY CONTROL UNIT

Quality Control or Quality Assurance is an activity or procedure, method or program that will ensure maintenance and continuity of specification and standards of the products during preparation, packaging, storage and distribution. This section has got a special weight age as no product can be dispatched marked without the green signal from the quality control department.

Quality plays an important role in any industry especially in food industry regarding the maintenance of product, hygiene and quality according to set standards. It is a very broad term as it refers to chemical, physical, technological, economical, and bacteriological and aseptically characteristics.

Quality Control covers the activities that help to keep the production running smoothly and efficiently and ensure that the finished products within the predetermined specifications. There are two sections of this department.

- **Testing of Raw Materials.**
    1. **Determination of Gluten Content in Wheat Flour**
    2. **Determination of Sedimentation Value of Wheat Flour**
    3. **Determination of titratable acidity of skim milk powder**
    4. **Determination of Iodine Value of fat/oil test**
    5. **Determination of peroxide value of fat/oil test**
    6. **Determination of free fatty acids of fat/oil test**
    7. **Determination of melting point of fat/oil test**
- **Testing of finished product.**
    1. **Determination of moisture content of biscuit**
    2. **Purity test of ammonium bicarbonate & sodium bicarbonate in biscuit**
    3. **Determination of ash test of biscuit**
    4. **Determination of acidity of extracted fat of biscuit**

Determination of Gluten Content in Wheat Flour

Procedure

1. 50gm of flour is kneaded with about 25ml water to make a dough ball
2. The dough ball is allowed to immerse in water for one hour to ensure hydration
3. After that the starch is washed out by kneading gently in a gentle stream of water over a fine sieve of silk till the washed liquid is clear
4. The cohesive gluten obtained is pressed as dry as possible & then weighed
5. The wet gluten so obtained is then dried at 100 degree C for 24 hr. and weighed again to get the value for dry gluten

Results

Gluten in a sample can be estimated by washing the dough free of starch, sugars, water soluble proteins, and other minor components. The wet cohesive mass obtained is wet gluten while the dried product obtained from it is called dry gluten.

Importance

It helps to understand the gluten content in flour and thereby selection of flour as per the product to be manufactured

Dry Gluten Calculation Formula

Sample with Petri dish – Sample with Petri dish after heating

100 Dry Gluten

Fig - Gluten test of Flour

Determination of Sedimentation Value of Wheat Flour

Theory

The sedimentation test is a physicochemical test that helps provides information on the baking quality of wheat flour. It is based on the suspension of flour in a dilute alcohol and acid solution which causes the flour particles to sediment. The sedimentation test is also used to grade different classes or types of wheat according to protein quantity and quality.

Equipment needed

1. Glass stoppered graduated cylinder(100ml)
2. Duram
3. 100-mesh sieve with collection pan (for flour preparation)
4. Sedimentation shaker

Sedimentation shaker -

Instrument description:

Sedimentation shaker is designed for smooth analysis of sedimentation value of samples under 50 or 100ml cylinders. These shakers are made for 5 or 6 cylinders; cylinder carrier (holding tray) is made either wooden or acrylic. These units feature smooth operation and movement at an angle of 30^{0} C from horizontal. For shaking/ oscillation a speed regulator is fitted at from side of the cabinet, by rotating it, user can set the RPM as required. A digital timer with buzzer is an optional accessory, it can be fitted on extra price which alerts when cycle (sedimentation period) ends. It is light weight in design, cost effective and offers long years of trouble free working performance.

Ingredients and reagents needed

1. Wheat flour
2. Isopropyl alcohol, 99%-100% pure
3. Lactic acid stock solution
4. Methylene blue
5. Bromophenol blue

Procedure

Sheive 3.2gm of wheat flour

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Take the sample in a Duran

↓

Take 50ml of distilled water & add 10-12 drops of Bromophenol blue indicator

↓

Shake and place the Duran in the sedimentation shaker and shake for 5min with ascillation between 40-43

↓

Then add 25ml of stock solution of isopropyl lactic acid solution and shake again for 5min with ascillation between 40-43

↓

Then stand the whole Duran for 5min and measure the sedimentation

Fig – Sedimentation shaker

Determination of titratable acidity of skim milk powder

Theory

The titratable acidity of dried milk is defined as the number of millilitres of a 0.1 N sodium hydroxide solution required to titrate a quantity of the reconstituted sample corresponding to 1 gm of fat free dry milk solids to the colour change point of phenolphthalein according to the procedure prescribed.

Reagents

- All reagents should be of analytical reagent quality
- Solution of sodium hydroxide standardized to 0.1 N± 0.0002.
- Distilled or de ionized water, free from carbon dioxide by boiling for 10min. before use.
- Phenolphthalein indicator solution: Dissolve 2g phenolphthalein in 70 %(v/v) ethyl alcohol and make up to 100ml. The ethyl alcohol should be neutralized if required.
- Reference colour solution: Dissolve 3g cobaltous sulphate ($CoSo_4 \cdot 7H_2O$) in distilled water and make up to 100ml.

Procedure

1 gm sample in a conical flask

↓

Add 50ml of luke warm water shake & dissolve sample

↓

Add 2-3 drops phenolphthalein indicator

↓

Titrate it against 0.1 (N) NaOH solution

↓

Light pink colour appears

Calculation

$$= \frac{9 \times \text{Titrate value} \times \text{strength value of NaOH}}{\text{Sample weight}}$$

$$= \frac{9 \times 1.3 \times 0.128}{1.0216}$$

$$= 1.408$$

- Standard value of titratable acidity of Skim milk powder of 1.8

Fig – determination of titrable acidity of SMP

Determination of Iodine Value of fat/oil test

Theory

The iodine number equals the number of mg of iodine required to saturate the fatty acids present in 100 mg of the oil or fat. Oils rich in saturated fatty acids have low iodine numbers.

Apparatus

Reaction flasks: Standard 250ml iodine flasks are advocated. Erlenmeyer flask, 500ml capacity, with standard taper covers may be used as a substitute.

Instrument description:

Heating mantles are used for heating or tempering organic liquids placed in reaction kettles, round-bottomed flasks, or relevant reaction vessels required for the boiling, evaporation, distillation, or extraction process. The products are designed using all fibreglass or have an aluminium outer shell and are available in many sizes. Heating mantles are available as stirring or non-stirring types, with controllers and without controllers. The products can obtain different ranges of temperature and have varied temperature regulation levels. Heating mantles provide short heat-up duration, even distribution of heat without creating condensed water, and are used in laboratories. The products do not produce flames and are safe for heating above 100°C.

Reagents

1. Carbon tetrachloride, analytical reagent grade
2. Iodine monochloride , Wjis's reagent, 0.22N
3. Potassium Iodide, 30% - Dissolve 30g of KI in purified water and dilute to 100ml
4. Sodium Thiosulphate solution , 0.1 N standard
5. Starch Indicator

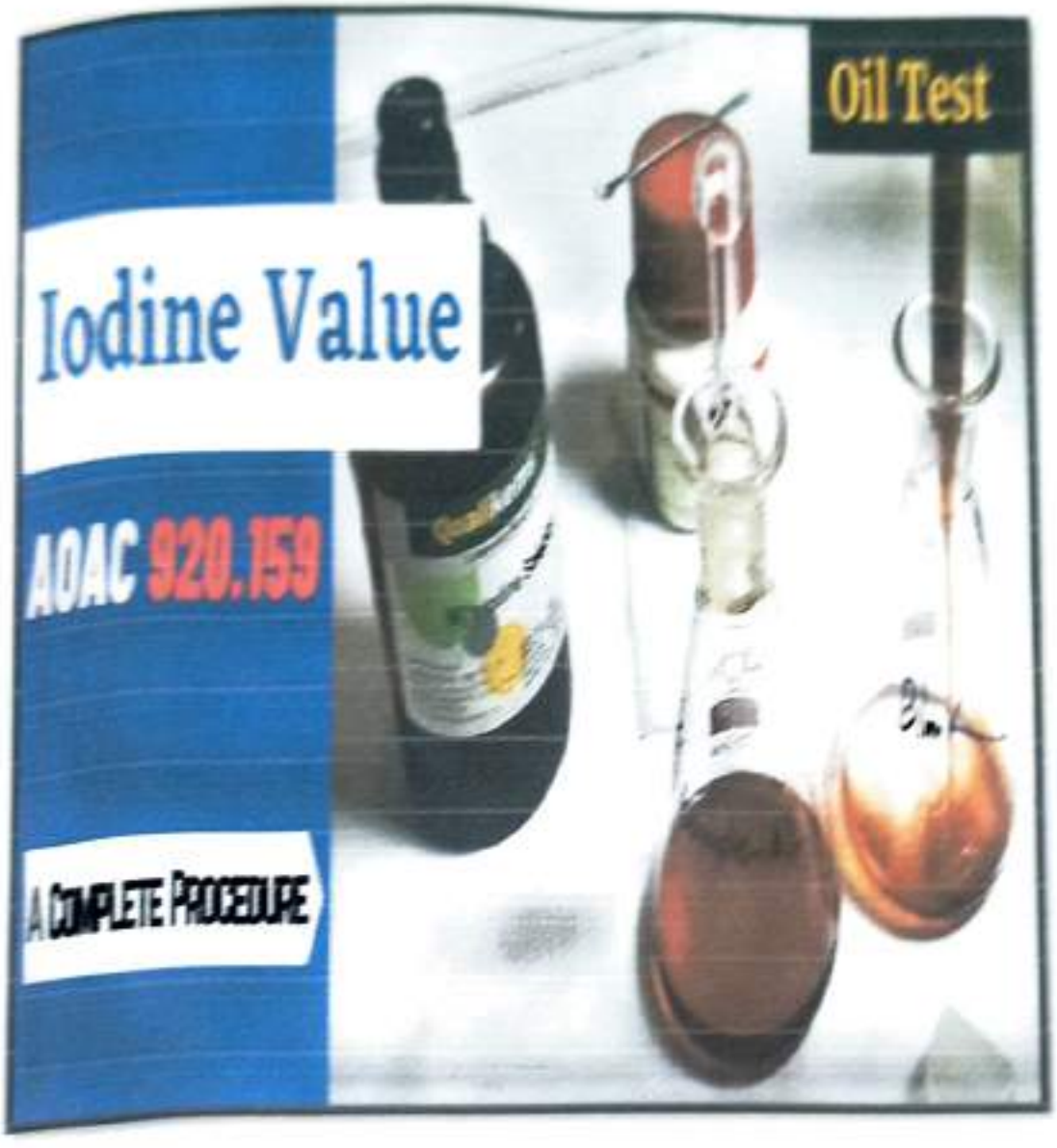


Fig – Testing of Iodine value

Procedure of flow chart of Iodine value

Sample 0.5gm

↓

Add 20ml of CCl_4 20ml

↓

Add Wjis's reagents 20ml

↓

Air tight with KI

↓

Rest 30 min

↓

Add water

↓

Titrate against add 15ml this of 10% KI solution

↓

Straw yellow colour

↓

Add 1% starch solution

↓

Blank

↓

Add 20ml of CCl_4 20ml

↓

Add Wjis's reagents 20ml

↓

Air tight with KI

↓

Rest 30 min

↓

Add Water

↓

Titrate against add 15 ml this of 10% KI solution

↓

Straw yellow colour

↓

Add 1% starch solution

↓

Black colour appeared

↓

Add again thio 0.1(N)

↓

Blue to colourless

Black colour appeared

↓

Add again thio 0.1(N)

↓

Blue to colourless

Calculation

$$= \frac{12.69 \times (\text{Blank} - \text{titrate value}) \times \text{strength of thio (0.1N)}}{\text{Sample weight}}$$

$$= \frac{12.69 \times (39.5 - 17.4) \times 0.1001}{0.4149}$$

$$= 67.66$$

Determination of peroxide value of fat/oil test

Theory

The peroxide value is defined as the reactive oxygen contents expressed in terms of milli equivalents (meq) of free iodine per kilogramme of fat. It is determined by titrating iodine liberated from potassium iodide with sodium thiosulphate solution.

Apparatus

- Evaporating flasks with stoppers (250ml capacity)
  - Rotary evaporator with vacuum pump
  - Pipettes (1ml, 5ml, 10ml, 20ml)
  - Measuring cylinders (25ml, 100ml)
  - Stop watches
  - Burette (50ml)
  - Erlenmeyer flasks(100ml, 200ml) with stoppers

Balance with at least 0.1g sensitivity

Reagents

i. 0.01N $Na_2S_2O_3$ solution
ii. Chloroform-acetic acid mixture(2:3)
iii. Saturated KI solution
iv. 1.5% starch solution

Procedure

5gm sample in iodometric flask

↓

Add stock solution of Chloroform & Acetic acid solution in the ratio of 2:3

↓

Add 0.5 ml saturated KI solution

↓

Add stopper & shake 1min

↓

Add 30ml of distilled water

↓

Add 1ml of 1% starch solution (colour change blue)

↓

Titrate the solution against 0.01 (N) $Na_2S_2O_3$ solution (Blue to colourless)

Calculation

$$\frac{(\text{Titrate value} - 0.05) \times 1000 \times \text{Strength of } Na_2S_2O_3 \text{ solution}}{\text{Sample value}}$$

$$\frac{(0.1 - 0.05) \times 1000 \times 0.01001}{4.8528}$$

0.1031 meq

Maximum value is 1

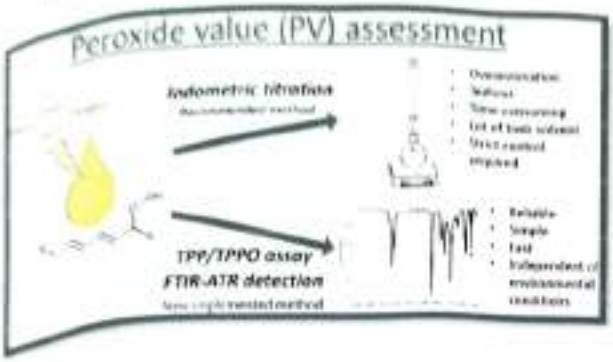


Fig – Detection of Peroxide Value of Oil

Determination of free fatty acids of fat/oil test

Theory

Free fatty acids are formed by the hydrolysis of oils (triglycerides). They are not bound or esterified to a glycol molecule. Crude oils and fats in natural form not refined contain small amounts of FFA , which are usually removed during the refining process. Oil becomes acidic with the oxidation or hydrolysis of moisture in the atmosphere leading to fatty acid formation.

Apparatus

- Conical flask
- Heating mantle
- Burette

Reagents

- 50 ml Neutral Ethyl Alcohol

- 10gm of sample
- 0.05N KOH

Procedure

Take 10 gm of sample in a conical flask

↓

Add 50ml of neutral ethyl alcohol

↓

Boil the solution in a heating mantle

↓

Titrate against 0.05N KOH

↓

Light pink colour appear

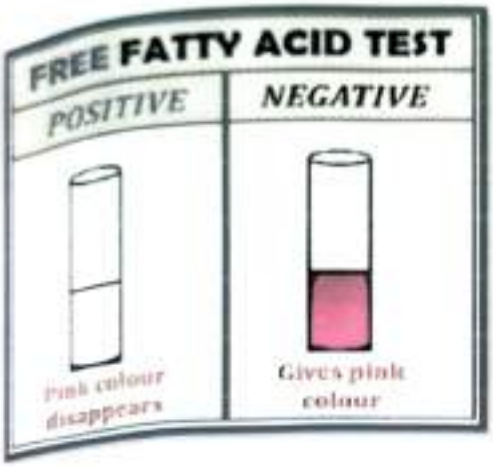
Calculation

$$\frac{28.2 \times \text{burette reading} \times \text{strength value of KOH}}{\text{Sample weight}}$$

$$\frac{28.2 \times 0.5 \times 0.48}{9.7124}$$

0.0697%

Fig. Detection of free fatty acid of oil



Determination of melting point of fat/oil test

Theory

The physical properties of a compound, such as melting point and boiling point can provide useful information which can help in the identification of a sample or to establish its purity. For determing melting point using a Meltemp apparatus. The melting point can be used to identify a substance and as an indication of its purity.

Apparatus

- Capillary tube
- Thiele tube method
- Electronic melting- point apparatus & automatic melting-point apparatus
- Thermometer

- Beaker with a side tube heating
- Heat source
- Refrigerator

Instrument description:

A melting furnace produces overhot temperatures which go above the metal's melting point and cause decomposition of its physical structure which results in liquefaction. This phase transition is wholly dependent on both pressure and temperature. It is uncommon that metals can exist in a liquid state at ambient temperatures, with the exception of known eutectics like gallium-based(Ga-) alloys and mercury(Hg). The melting furnace has to be capable of producing and maintaining the requisite temperatures over a prolonged period to achieve a homogeneous molten mixture.

Procedure

Melt the sample and filter it through a filter paper to remove any impurities and last traces of moisture . Make sure that the sample is absolutely dry and mix the sample thoroughly to

analysis of melting point of oil and fat

↓

Introduce a Capillary tube into the molten sample, so that a column of the sample, about 10mm long , is sucked into the tube

↓

Dip at least 3 clean capillary tubes in the completely liquid sample so that the sample rises about 10 min high in tubes

↓

Chill the sample at once by holding the ends of the tubes that contain the sample against a piece of ice until the fat solidifies. Place the tube in a small beaker and hold it in a refrigerator at 4 degree C to 10 degree C for 16 hours

↓

Remove the tube from the refrigerator and attach with rubber band to the thermometer bulb are at the same level

↓

Suspend the thermometer in 600ml beaker of clear distilled water. The bottom of thermometer is immersed in the water to the immersion mark

↓

Take water at 10 degree C in the 'Thiele' tube and immerse the thermometer with the capillary tube containing the sample of fat

↓

Gradually increase the temperature by heating at the side-tube of the Thiel Tube at the rate of 2 degree C per min, till the temperature reaches 25 degree C, thereafter at the rate of 0.5 degree C per min .Note the temperature of the water when the sample column begins to rise the in the capillary tube

↓

Report the average of two such separate determinations as the melting point of oil and fat, provided that the reading do not differ by more than 0.5 degree C

Fig – Melting – point apparatus

Determination of moisture content of biscuit

Theory

The level of moisture in flour is important mainly for the issue of storage . When the moisture level exceeds 15% the shelf-life of the flour is greatly reduced. Generally the moisture will be 10-14%, which when stored in appropriate conditions (relatively cool, dry and aerated). Allows for plenty of shelf-life. There is a correlation between moisture content and water absorption but can be counteracted by starch damage.

Requirements

Wheat flour sample, Infrared Moisture Balance.

Instrument description:

Determined as a well suited instrument for quick weight loss by the **American Institute of Banking** the Infrared Moisture Balance offers a high quality and a fast-paced method of drying using inexpensive equipment. The Infrared Moisture Balance produces repeatable and accurate results when compared with the standard oven method. Infrared Moisture Balance not only test samples significantly faster, they save floor and counter space, reduce heat in the work area and significantly boost production rates. Also, this save energy & reduces costs in product manufacturing. With easy access to Infrared Moisture Analyzers throughout production & laboratories, moisture results can be performed numerous times in a single hour. When compared with the 24 hour oven method.

Procedure

Clean the container with lid dry it and weight it

↓

Keep the container in the oven with lid removed. Dry the specimen to constant weight maintaining the temperature between 105 degree C

↓

The reading appeared on the screen and noted down

Results

- Moisture content of Sugar Free biscuit - 2.08
- Moisture content of Golden Marie biscuit- 1.4
- **Standard value of moisture content in biscuit = 1**

Fig - Instant moisture calibration machine

Purity test of ammonium bicarbonate & sodium bicarbonate in biscuit

Procedure

0.1 gm sample in a conical flask

↓

Add 50 ml of distilled water

↓

Add 2-3 drops of methyl orange indicator

↓

Colour turns orange

↓

Titrate it against 0.2N HCL

↓

Colour changes to light pink

Calculation

- For ABC (Amonium bicarbonate)

$$\frac{7.9 \times \text{Titrate value} \times 0.2\text{N strength of HCl}}{\text{Sample weight}}$$

~98% minimum

- For SBC (sodium bicarbonate)

$$\frac{8.4 \times \text{Titrate value} \times 0.2\text{N strength of HCl}}{\text{Sample weight}}$$

~99% minimum

fig – process of ABC and SBC test

Determination of ash test of biscuit

Theory

The analysis of ash content in foods is simply the burning away of organic content, leaving inorganic minerals. This helps determine the amount and type of minerals in food; important because the amount of minerals can determine physiochemical properties of foods, as well as retard the growth of microorganisms.

Procedure

An Ash test involved taking a known amount of sample, placing the weighed sample into a dried / pre-weighed porcelain crucible, burning away the polymer in an air atmosphere at temperatures above 500 degree C, and weighing the crucible after it has been cooled to room temperature in desiccators. Ash residue remaining in the crucible is considered filler unless the residue is less than 1%. Residues of less than 1% are typically the result of additives that did not burn off.

Calculation

Crucible with ash = 36.29669

Ash amount = (36.29669 – 36.29213)

= 0.0048

Mix- 0.7%

$$\frac{0.0048 \times 100}{9.7386}$$

= 0.049%

Dry basis insoluble ash amount= 0.049%

Fig - Muffle Furnace

Instrument description:

The muffle furnace is one of the most commonly used device for carrying out the combustion of the test samples in isolation and turn them in to ashes completely without any interference of the external factors. The muffle furnace is an instrument that is provided with a closed chamber where the test sample can be placed. The device comes with a heating arrangement that can be used for combustion of the sample.

The muffle furnace offered by Pacorr is made from high grade mild steel from outside and stainless steel from inside. Proper insulation is provided to avoid any type of heat escaping from the device. There is a digital controller given with the device which is very helpful in monitoring of the time as well as the temperature in the chamber. The temperature is controlled with two Kanthal wires heating elements and an advanced PID controller. With the help of this instrument, the manufactures in the food industry can easily assess the ash content of their products and deliver high quality of products to the customers.

Determination of acidity of extracted fat of biscuit

Theory

Fat plays an important role in many foods. Food contribute to the flavour of food as well as it gives texture and also mouth feel to the food. It is an important component which gives us maximum energy. Lipid in food present in various forms like monoglycerides , diglycerides , triglycerides , sterol & fatty acid , phospholipids, carotenoids & fat soluble vitamins. Lipid is soluble in organic solvent and insoluble in water, because of this, organic solvents like hexane, petroleum ether have the ability to solubilise fat & fat is extracted from food in combination with the solvent. Later the fat is collected by evaporating the solvent. Almost all the solvent is distilled off & can be reused.

Requirements

- Weighing balance
- Soxhlet apparatus
- Drying oven
- Thimble
- Heating mantle
- Glass rod
- Desiccator with silica gel
- Petroleum ether (Boiling temperature 60-80 degree C)
- Cotton plugs

Instrument description:

A Soxhlet extractor is a piece of laboratory apparatus invented in 1879 by Franz von Soxhlet. It was originally designed for the extraction of a liquid from a solid material. Soxhlet extraction used when the desired compound has a limited solubility in a solvent and the impurity is insoluble in the solvent. Soxhlet extractor has three main sections: a percolator (boiler and reflux) which circulates the solvent, a thimble (usually made of thick filter paper) which retainthe to be extracted, and a siphon mechanism, which periodically empties the thimble.

Procedure

Weight of flat bottom flask

↓

Smashed biscuit

↓

Smashed biscuit in thimble

↓

Stopped in tissue paper

↓

The thimble is then threw into the Soxhlet

↓

The petroleum benzene is poured into the flask through Soxhlet

↓

Water filled stopper in filled the stopper is placed on the top of the Soxhlet (60-80 degree C)

↓

The mixture of petroleum and oil is then evapated from thimble and poured into the flask through 16 cycles

↓

After 16 cycle, the flask will be filled with the mixture of petroleum benzene and oil

↓

Extracted oil amount (1-2gm)

↓

Rest of the procedure same like FFA test

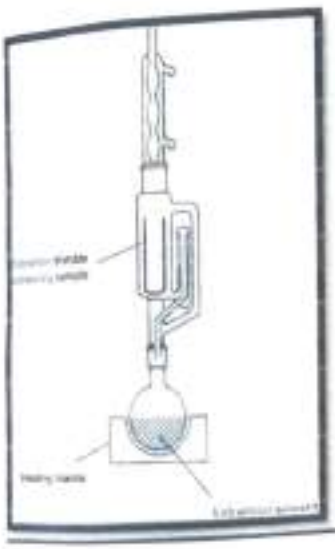


Fig – determination of extracted fat from the biscuits

Water filled stopper in filled the stopper is placed on the top of the Soxhlet (60-80) degree C)

↓

The mixture of petroleum and oil is then evapated from thimble and poured into the flask through 16 cycles

↓

After 16 cycle, the flask will be filled with the mixture of petroleum benzene and oil

↓

Extracted oil amount (1-2gm)

↓

Rest of the procedure same like FFA test

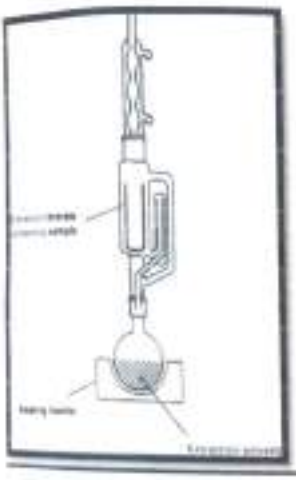


Fig – determination of extracted fat from the biscuits

Conclusion

Industrial visit is a most practical approach towards learning through interaction working practices etc. and hence gives a perfect reality check to the students .

It gives a lot of information about various aspects of production , marketing as well as the operation of a company . The dissemination of knowledge by the support organization also gives a clear scope to the transactional analysis of the company .

The industry is better to understand the world of work and to compare acquired in college . Observations were carried out over a real and direct the development of the task performed by a students who ultimately diligently in preparation for the plunge in the community or in the world of work .

During this training session we were also told about how we can control the environment pollution and the method installed in the industry to minimize the pollution.

It helped us to develop our confidence and to bridge a connection between the theoretical study & practical works .

Group Photo

Raja Udyog Private Ltd.

(Formerly known as Raja Biscuit Industries Private Limited)

Registered Office : 16F, B.T. Road, Sukchar Girja, 24 Pgs. (N), Kolkata - 700115 (W.B.)

Ph : 9830332586 / 9830537843 / 9830337843 / 25939466, E-mail : rudfact@gmail.com

CIN : U15412WB2001PTC092881

June 15th, 2022

TO WHOM IT MAY CONCERN

This is to certify that **Ms. Sathi Lohar** student of 1st year, **M.Voc in Food Technology, Nutrition & Management** stream from **Mugberia Gangadhar Mahavidyalaya, Bhupatinagar, Purba Medinipur** has successfully completed her **Industrial Training** in Laboratory & Production department of our organization between the period from 15th May 2022 to 14th June 2022.

During the above period we found her sincere & hard working and she has taken proper initiative and efforts towards completing her Industrial training.

We wish all the success in her future endeavors.

For Raja Udyog Pvt.Ltd.

Sanjoy Chakraborty

(SANJOY CHAKRABORTY)
General Manager