

The Complete Technology Book on Cocoa, Chocolate, Ice cream and other Milk Products

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Cocoa, Chocolate and Ice Cream are the products which has a good nutritious value and relatively inexpensive food. Cocoa butter is used in chocolate and to cover other confectionery products. Now a day chocolate and ice cream are gaining good popularity among the society all over the world. Chocolate is a key ingredient in many foods such as milk shakes, candy bars, ice creams etc. It is ranked as one of the most favorite flavors in the world. Despite its popularity, most people do not know the unique origins of this popular treat. Chocolate is a product that requires complex procedures to produce. The process involves harvesting coca, refining coca to cocoa beans, and shipping the cocoa beans to the manufacturing factory for cleaning, coating and grinding. These cocoa beans will then be imported or exported to other countries and be transformed into different type of chocolate products. Ice cream is a frozen dessert usually made from dairy products, such as milk and cream, and often combined with fruits or other ingredients and flavors. The meaning of ice cream varies from one country to another like frozen custard, frozen yogurt, sorbet, and gelato and so on. The ice cream industry has traditionally grown at a healthy rate of 12% per annum. India is the second largest milk producing country. Milk products like butter, curd, ghee, etc have become an essential part of our food and are consumed in good quantity every day. In spite of the huge demand that exists for such milk based items conventional methods are employed for producing these items. The growth in cocoa, chocolate, Ice cream and other milk product industry has been primarily due to strengthening of distribution network and cold chain infrastructure.

Some of the fundamentals of the book are cocoa bean production, sources of cocoa bean supplies, refining for production of chocolate masses for different uses, shipment of cocoa beans, cocoa processes , cocoa for drinking, instant cocoas, drinking chocolates manufacturing cocoa, cocoa butter & replacement fats , coatings and cocoa , chocolate manufacture, chocolate bars and covered confectionery , chocolate molding, determination of fat in cocoa and chocolate products, determination of cooling curve of cocoa butter and similar fats, the manufacture of dairy products, ice cream manufacture, energy value and nutrients of ice cream etc.

The present book contain formulae, processes and other relevant details related to manufacture of cocoa products, chocolates, ice cream and other milk products. An attempt has been made to bring in to focus the significant aspect of cocoa products, dairy products manufacturing. It is hoped that the subject matter contain and its presentation will be very helpful to new entrepreneurs, professionals, institutions, technocrats and students etc.

1. COCOA BEAN PRODUCTION

Introduction

Botanical types

The preparation of cocoa beans

Fermentation

Drying

The cut test

Sources of cocoa bean supplies

Shipment of cocoa beans

Infestation of cocoa

Microbiology of cocoa

2. COCOA MASS, COCOA POWDER, COCOA BUTTER

Introduction

Cocoa mass

Cocoa powder

Cocoa butter

Quality control

3. PARTICLE SIZE REDUCTION

Introduction

Current types of particle size reduction process

Grinding cocoa nib into cocoa mass

Refining of chocolate masses

The roll refiner

Refining for production of chocolate masses for different uses

4. COCOA PROCESSES

Raw Bean Cleaning

Roasting

The NARS Process

Micronizer

Roasting of Nib

Sterilization

Alkalization

Cocoa Liquor Treatment

Winnowing (Cracking & Fanning)

Winnowing Machines

Large nib:

Small nib:

Nib dust (fine nib)

Shell dust, small shell, cyclone dust

Large shell

NIB GRINDING, COCOA LIQUOR, HEAT TREATMENT

Ball or Bead Mills

PROCESSING OF COCOA LIQUOR

Flavour Development Processes

(The following is a summary of the methods used.)

Simple Heating of Thin Films

Thin Film Roasting and Air Scrubbing

Thin Film Roasting with Vacuum

General Comments

ALKALIZATION

Alkalization of Nibs

Alkalization of Liquor

Drying, Roasting, Pressing, and Grinding

Alkalization of Cocoa Cake

Alkalization of Whole Beans

Water Treatment

LIQUOR PRESSING

Temperature of the Liquor

Moisture Content

Degree of Roast/Protein Coagulation

Homogenizing

Particle Size

Pressures

EXPELLER PRESSING

COCOA GRINDING

Cocoa Fineness

COCOA FOR DRINKING, INSTANT COCOAS, DRINKING CHOCOLATES MANUFACTURING

COCOA

Drinking Cocoa

Instant Cocoa

Drinking Chocolate

COCOA POWDER MICROBIOLOGY, COMPOSITION, ANALYSIS

Cocoa Composition and Specifications

Contamination and Adulteration of Cocoa Powder

5. Cocoa Butter & Replacement Fats

COCOA BUTTER

Prime Pressed Cocoa Butter

ExpellerPressed Cocoa Butter

SolventExtracted Cocoa Butter

Constitution of Cocoa Butter

Properties of Cocoa Butter

New Sources of Supply Natural Variations

Supercooling, Cooling Curves

Crystallization, Polymorphism

Hardness, Penetration

Contraction

Solvent Extraction of Cocoa Butter

Refining of SolventExtracted Fat

Deodorization of Cocoa Butter

COCOABUTTER REPLACEMENT FATS

Equivalent Fats (CBE)

Substitute Fats (CBS)

Other Fats Associated with Cocoa Butter

Allied Fats

6. EMULSIFIERS IN CHOCOLATE CONFECTIONERY

7. COATINGS AND COCOA

VEGETABLE LECITHINS

Soya Lecithin

Other Vegetable Lecithins

Fractionated and Modified Vegetable Lecithins

USE OF VEGETABLE LECITHIN AND OTHER PHOSPHOLIPIDS IN CHOCOLATE

SYNTHETIC PHOSPHOLIPIDS AND MODIFIED VEGETABLE LECITHINS

Toxicity Checks on YN

Viscosity

Other Physical Effects of Lecithin Addition

Other Surface Active Compounds

RHEOLOGY, VISCOSITY, DEFINITIONS, MEASUREMENT OF VISCOSITY

VISCOMETERS

Simple Viscometers

Rotational Viscometers

The Gardner Mobilometer

USE OF LECITHIN IN CHOCOLATE, COCOA POWDER, CHOCOLATE DRINKS

Chocolate

Cocoa and Drinking Chocolate Powders

8. CHOCOLATE MANUFACTURE

INGREDIENTS

Sugar and Other Sweeteners

Cocoa Butter

Milk Products

Emulsifiers

Other Fats

FLAVOUR

REWORK

CHOCOLATE PROCESSES

Preparation of Ingredients

Mixing

Refining

Milk Chocolate Processes

Conching

Other Conches and Chocolate Making Systems

Viscosity of Chocolate

8. CHOCOLATE BARS AND COVERED CONFECTIONERY

PRODUCTION METHODS

Molding

Enrobing

Panning

Tempering

OTHER CHOCOLATE PROCESSES

Chocolate Drops (Chips)

Roller Depositing

Aerated Chocolate

Chocolate Flake or Bark

Chocolate Vermicelli or Streusel

Laminated Chocolate

Chocolate Tempering

Compound Coatings

Measurement of Degree of Temper

CHOCOLATE MOLDING

Molding Chocolate Blocks or Bars

Hollow Goods

Foiled Articles

Shell Forming Equipment

The Westal SCB Process

COMPOSITION OF CHOCOLATE FOR MOLDING

MOLDING AND SHELL PLANT COOLERS

Tablets

Shells

GOOD MANUFACTURING PRACTICE

CHOCOLATE ENROBING

Mechanical

Chocolate Cooling

Enrober Coolers

Automatic Enrober Systems
Chocolate Enrobing Problems
Zein Glazes

9. QUALITY CONTROL

Who Decides the Standard of Quality?
Who Controls Quality?
How Should Quality Control Be Organized?

RAW MATERIALS

Type of Raw Material
The Supplier

PROCESS CONTROL

InLine Process Control

FINISHED PRODUCT INSPECTION

Appearance
Incidence of Sampling Taste Checks
Weight Control
Shelf Life Keeping Limits and Keeping Tests
Microbiological Quality Control
Food poisoning
Factory Hygiene and Sanitation
Prevention of Foreign Matter Contamination
Travel Tests

10. SPECIAL METHODS OF ANALYSIS

PARTICLESIZE DETERMINATION

Methods of Determination
Micrometer
Metriscope
Method of Determination
Microscopes
Sieving Methods for Determining Particle Size
Elutriation (Sedimentation) Methods
Particle Sizing by Laser Beam
The Coulter Counter

DETERMINATION OF FAT IN COCOA AND CHOCOLATE PRODUCTS

Rapid Methods using Trichlorethylene Extraction
Refractometer Methods
Determination of Fat Using Nuclear Magnetic Resonance
Determination of Cooling Curve of Cocoa Butter and Similar Fats
Method Apparatus
Procedure
The Melting Point of Fats
Determination of Fusion, Slip and Clear points
Determination
Softening Point of Fats
Barnicoat Method
Hardness of Fats

Foam Test Modified Bickerman Method

WATER ACTIVITY, EQUILIBRIUM

RELATIVE HUMIDITY

Determination of A/W
Calculation of A/W/ERH
Determining A/W Using Solutions of Salts
A/W Determination by Protimeter

SCIENTIFIC INSTRUMENTS EMPLOYED IN PRODUCTION DEPARTMENTS

Viscometers

Refractometers

1. Traditional Method

2. Standardized Method

SWEETENED DAHI

Market Quality

Packaging and Storage

Keeping Quality

Increasing Keeping Quality

Dahi Powder

1. Whole Milk Dahi

2. Skimmed Milk Dahi

11. THE MANUFACTURE OF DAIRY PRODUCTS

Butter

CHURNING

CHEESE

THE MANUFACTURE OF HARD CHEESE

SOFT CHEESE

12. TECHNOLOGY OF KHOA MANUFACTURE AND STORAGE

DEFINITION

KHOA A REMUNERATIVE PRODUCT WITH SIMPLE TECHNOLOGY

VARIETIES AND GRADES OF KHOA

1. Pindi

2. Dhap

3. Danedar

CHEMICAL COMPOSITION OF KHOA

MICROBIOLOGICAL QUALITY OF KHOA

EXISTING TRADE PRACTICES

METHODS OF MANUFACTURE

SMALL SCALE PREPARATION OF KHOA

1. Equipment

2. Quality of Milk

3. Traditional Process

IMPROVED BATCH METHOD FOR KHOA PREPARATION

PACKAGING AND STORAGE OF KHOA

LEGAL ASPECT OF KHOA MANUFACTURE

13. TECHNOLOGY OF MANUFACTURE OF YOGHURT AND DAHI

YOGHURT

2. Details of Manufacture

METHOD OF PREPARATION OF FLAVOURED YOGHURT

CURD (DAHI)

DEFINITION

CLASSIFICATION

FOOD AND NUTRITIVE VALUE

COMPOSITION

USES OF DAHI

SWEET SOUR DAHI

1. Traditional Method

2. Standardized Method

SWEETENED DAHI

Market Quality

Packaging and Storage

Keeping Quality

Increasing Keeping Quality

Dahi Powder

1. Whole Milk Dahi

2. Skimmed Milk Dahi

14. FLAVOUR DEVELOPMENT IN CHOCOLATE

Introduction

Fermentation

Drying

Roasting

Conching

Conclusion

15. ICE CREAM

16. ENERGY VALUE AND NUTRIENTS OF ICE CREAM

ENERGY VALUE AND NUTRIENTS

CALORIC CONTENT OF ICE CREAM AND RELATED PRODUCTS

PROTEIN CONTENT OF ICE CREAM

MILKFAT CONTENT

CARBOHYDRATES IN ICE CREAM

MINERALS IN ICE CREAM

VITAMINS IN ICE CREAM

PALATABILITY AND DIGESTIBILITY

OF ICE CREAM

17. ICE CREAM INGREDIENTS

OPTIONAL INGREDIENTS

COMPOSITION OF MILK

MILK PRODUCTS USED IN ICE CREAM

Sources of Fat

Skim Milk and Buttermilk, Liquid and Dry

Dry Whole Milk

Concentrated Milks

Special Commercial Products

Mineral Salts

SWEETENERS

Relative Sweetness

Effect of Sweeteners on Freezing Point

Sucrose

Corn Sweeteners and Related Ingredients

Maple and Brown Sugars

Honey

Nonnutritive Sweeteners

Fat Replacers

Sugar Alcohols

Syrups

18. STABILIZERS AND EMULSIFIERS

USES OF STABILIZERS

KINDS OF STABILIZERS

CHARACTERISTICS OF INDIVIDUAL STABILIZER INGREDIENTS

ICE CREAM IMPROVERS

EMULSIFIERS

INDUSTRIAL USAGE

19. FLAVOURING AND COLORING MATERIALS

FLAVOURS FOR FROZEN DESSERTS

VANILLA

Imitation Vanilla Flavourings

Consistency in Vanilla Quality

Vanilla Ice Cream

CHOCOLATE AND COCOA

Processing Cocoa Beans

Characteristics of Cocoa

Chocolate Ice Cream

Preparing Chocolate Syrup

Freezing Characteristics

Chocolate Confections

FRUITS IN FROZEN DESSERTS

Fresh Fruit

Candied and Glaced Fruits

Dried Fruits

PROCEDURES AND RECIPES

Strawberry Ice Cream

Raspberry Ice Cream

Peach Ice Cream

Cherry Ice Cream

Ice Cream with Complex Flavours

Sugar Free

NUTS

SPICES AND SALT

COLOR IN FROZEN DESSERTS

FLAVOURING LOWFAT AND NONFAT ICE CREAM

20. MIX PROCESSING

PREPARATION OF THE MIX

Combining the Ingredients

PASTEURIZATION OF THE MIX

HOMOGENIZATION

AGING MIXES

PACKAGING MIXES FOR SALE

FLAVOURING MIXES

21. THE FREEZING PROCESS

PREFREEZING TESTS

FREEZING OPERATIONS

CHANGES THAT TAKE PLACE DURING THE FREEZING PROCESS

REFRIGERATION NEEDED TO FREEZE ICE CREAM

CALCULATING REFRIGERATION REQUIREMENTS

TYPES OF FREEZERS

The Continuous Freezer

The Refrigeration System

Advanced Programmable Freezers

Shut Down and Cleaning of the Freezer

The Batch Freezer

Operation of the Batch Freezer

Filling Containers from a Batch Freezer

22. FANCY MOLDED ICE CREAMS, NOVELTIES, AND SPECIALS

PRODUCTION SYSTEMS

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