Food Preservation has become an integral part of the food processing industry. There are various methods of food preservation: drying, canning, freezing, food processing etc. Food processing is one the method of food preservation which is the set of methods and techniques used to transform raw ingredients into food or to transform food into other forms for consumption by humans or animals either in the home or by the food processing industry. Canning is one of the various methods of food preservation in which the food is processed and then sealed in an airtight container. This process prevents microorganisms from entering and proliferating inside. Dehydration is the process of removing water or moisture from a food product. Food dehydration is safe because water is removed from the food. Freezing is also one of the most commonly used processes commercially and domestically for preserving a very wide range of food including prepared food stuffs which would not have required freezing in their unprepared state. Benefits of food processing include toxin removal, preservation, easing marketing and distribution tasks, and increasing food consistency. In addition, it increases seasonal availability of many foods, enables transportation of delicate perishable foods across long distances and makes many kinds of foods safe to eat by deactivating spoilage and pathogenic micro organisms. Nanotechnology exhibits great potential for the food industry. New methods for processing nanostructures are being developed having novel properties that were not previously possible. As such, due to the recent up gradation of preservation techniques, the preservation industry is also growing almost at the same rate as the food industry which is about 10 to 12% per year. The purpose of this book is to present the elements of the technology of food preservation. It deals with the products prepared from various fruits and vegetables commercially. Relevant information on enzymes, colours, additives, flavours, adulteration, etc., has been given. This book also contains photographs of equipments and machineries used in food preservation. This book will be very useful for new entrepreneurs, food technologists, industrialists, libraries etc.

Contents

1. Introduction of Food Technology
Source of Man's Food
Impact of Science and Technology

2. Acceptable Food to Eat
   Nature's Seal of Quality
   Food Flavors
   Food Colors
   Our Senses Can Fail Us
   Excessive Heating Impairs Foods,
   Moderate Heating May Improve Foods
   Food Spoilage
   Must Deter Natural Processes
   Safe Food for Man
   Food Poisoning
   Food Intoxications
   Food Infections
   Sanitation and Health

3. The Refrigerated Storage of Perishable
   Commodities
   Temperature of Objects
   Temperature Measurements
   Metabolism a Function of Temperature
   Energy Deficit of Ice
   Creating Energy Deficits Mechanically
   Keeping Fresh Foods Edible
   Animals Foods
   Plant Food
   Temperature of Cold Storage Rooms
   Humidity of Storage Chamber
   Heat Evolved by Living Tissues
   Specific Heat of Foods
   Calculation of Refrigeration Load
   Cold Injury of Fruits and Vegetables
   Ammonia Injury to Refrigerated Fruits and Vegetables
   Waxing Foods to Prevent Shrinkage
   Effect of Cold Storage on Quality
   Preserving Foods in a Micro-Environment
   Packaging Materials Tests Which May Be Performed
   Formed Container Tests
   Disorders of Stored Foods

4. Principles of Food freezing
   Development of a Frozen Food Industry
   The Freezing Point of Foods
   Per Cent Water Frozen vs. Temperature of Food
   and Its Quality
   Size of Ice Crystals Formed
   Volume Changes During Freezing
   Refrigeration Requirements in Freezing Foods
   Establishing the Refrigeration Requirements to
   Freeze Food
   Freezing in Air
   Freezing by Indirect Contact with Refrigerants
Direct Immersion Freezing
Freezerburn
Packaging requirements for Frozen Foods
Influence of Freezing on Micro-organisms
Influence of Freezing on Proteins
Influence of Freezing on Enzymes
Influence of Freezing on Fats
Influence of Freezing on Vitamins
Influence of Freezing on Parasites
Thawing Damage to Frozen Foods

5. Principles of Food Preservation by drying
Drying a Natural Process
Dehydration-Artificial Drying
Dehydration vs. Sun Drying
Why Dried Foods
Dehydration Permits Food Preservation
Humidity-Water Vapor Content of Air
Air-The Drying Medium
Adiabatic Driers
Heat Transfer Through a Solid Surface
Criteria of Success in Dehydrated Foods
Freeze-Dehydration (Freeze Drying)
Triple Point of Water
Temperature Changes in Meat Freeze-Dehydration
Influence of Dehydration on Nutritive Value of Food
Influence of Drying on Micro-organisms
Influence of Drying on Enzyme Activity
Influence of Drying on Pigments in Foods
Dehydration of Fruits
Dehydration of Vegetables
Dehydration of Meat
Dehydration of Fish
Dehydration of Milk
Dehydration of Eggs
Packing of Dehydrated Foods
Influence of Drying on Food Acceptance

6. Principles of Food Preservation by Canning
The Art of "Appertizing"
Temperature vs. Pressure of Boiling Water
Spoilage of Food Caused by Micro-organisms
Evolution of Containers for Canning
Important Food Groups
Micro-organisms Associated with the Food Groups
Sources of Spoilage Organisms
Heat Resistance of Micro-organisms
Important in Canning
Factors Influencing the Heat Resistance of Spores
Influence of Food Ingredients on Heat Resistance of Spores
Heat Resistance of Enzymes in Food
Heat Penetration into Food Containers and Contents
9. Preservation of Foods with Chemical Additives

Introduction
Definition of Chemical Additive
Importance of Chemical Additives
Legitimate Uses in Food Processing
Undesirable Uses of Additives
Safety of a Food Additive
Functional Chemical Additive Applications
Historical Significance
Specific Uses of Chemical Additives
Additives Permitted and Prohibited in the United States
Chemical and Use
Food Regulation and Compliance
Miller Pesticide Amendment of 1954
1958 Food Additives Amendment
1960 Color Additives Amendment
Chemical Preservatives
Preservatives (Antimycotics)
Specified Uses and Amounts
Preservatives (general)
Specified Use
Microbial Antagonists
Antibiotics
Quality Improving Agents
Other Chemical Additives
Artificial Flavoring
Artificial Coloring
Other Agents
Chemical Additives and the Future

10. Preservation of Food with Ionizing Radiations
A Place for Radiation Stablized Foods
Discovery of Radioactivity
Alpha, Beta and Gamma Radiations
Dosimetry
Dose Distribution
Induced Radio-Activity in Treated Food
Mode of Action of Ionizing Radiations
Radiation Effects on Micro-organisms
Radiation Effects on Proteins
Radiation Effects on Enzyme Systems
Effects of Radiation on Amino Acids
Effects of Radiation on Vitamins
Radiation Effects on Carbohydrates
Radiation Effects on Lipids
Radiation Effect on Pigments
Radiation Effect on Parasites and Insects
Packaging of Radiation Stablized Foods
General Methods for establishing Radiation Stabilization Process for Foods

NIIR Project Consultancy Services (NPCS) 5/9
The Food Product-Micro-organism Destruction
Dose Requirements for the Radiation Sterilization
of Foods
Technological aspects of the Radiation Pasteurization
of Foods
Radiation Resistant Organisms
Factors Influencing the Survival of Micro-organisms
from a Radiation Process
The Influence of the Type of Radiation on the
Inactivation of Micro-organisms
The Influence of Dose Rate on the Inactivation of
Micro-organisms
The Influence of Environmental Conditions on the
Survival of Micro-organisms from a
Radiation Process
Combination Processes
Conditions after Irradiation Affecting Survival and
Recovery of Micro-Organisms
The Food Product-Enzyme Destruction
Process for Radiation Sprout Inhibited White Potatoes
Process for Insect De-infestation of White Flour by
Irradiation
The Process for Food Stabilization
Process-Heat Inactivation of Enzymes plus
Radiation Destruction of Micro-organisms
Process and Product Specifications
Process for Radiation-Pasteurized Plant Tissues
(Fruits)
Process for Radiation-Pasteurized Animal Flesh
(Sliced Bacon)
Process for Radiation-Sterilized Meat (Chicken),
Fish and Vegetables
Non-Heat Method for Controlling Enzymes in Meat
Design of Radiation Processing Food Plants
Wholesomeness of Radiation Stabilized Foods
Some Public Health aspects of the Microbiology of
Irradiated Foods
Acceptability of Radiation Stabilized Foods
Quality Control with Radiation Stabilized Foods
Ionizing Radiations as a Unit Operation in the
Food Industry

11. Preservation of Semi-moist Foods
Introduction
Canned white bread
Storage stability
Sponge and Dough
Filling and Proofing
Processing
Finished Product
Fungistatic and fungicidal agents
Sorbic acid
Polyethylene
Semi-moist Pet Foods
Process for Semi-moist Pet Foods
Marbled, Textured Product
Water Activity
Production of Semi-moist Products Growing
Semi-moist Human Foods
Coarse Ground Beef and Beef Cubes
Other Products being developed

12. Principles and Preservation of Bakery Products
Introduction
Principles of Baking
Dough
Influence of Flour Proteins
Flour Improvers
Other Components of Flour
Yeast Raised Dough Products
Heat Generated During Mixing Doughs
Heat of Hydration
Cooling Requirements
Continuous Bread Making Process
Typical Formulations for Yeast Raised Bakery Products
Baking Schedules
Baking Reactions
Chemically Leavened Bakery Products
Leavening Acids
Baking Powders
Elements of Cookie Technology
Cookie Flour
Sugar
Shortening
Eggs
Ammonia
Water
Baking Acids
Soda
Miscellaneous Ingredients
Mixing and Baking
Quality Cookie Chart
Elements of Cake Technology
General Rules for Formulating Cakes
Cake Formulations
Principles of Processing Cakes
Baking
Refrigerated Doughs
Preservation of Bakery Products
Fresh Bakery Products
Freezing of Bakery Products
Packaging
Storage Life of Frozen Bread
Cookies and Cakes
Nutrient Losses in Bakery Products
Packaged Fresh Bread
Packaged Fresh Cookies, Crackers, Bakery Goods, Cake Mixes
The Future

13. Storage Stability of Preserved Foods
Introduction
Relationships of Product Qualities and Storage conditions
Objective Tests of Quality of Stored Foods
Objective Odor Measurements
Mechanical Texturemeter
Long-term Storage of Preserved Foods
Temperature of Storage
Nutrients
Containers for Long-Term Storage
Storage Costs
Storage Stability of Selected Frozen Foods
Result
The Future

14. Food Preservation Using Ozone
Introduction
Physicochemical Properties of Ozone
Use of Ozone in Storage and Packing Facilities
Extension of Storage Life with Ozone
Ozonation to Sanitize packing Line Process Water
The Commercial Production of Ozone
Importance of Ozone in Fishing Industry
Future Perspectives

15. Food Preservation by Smoking Process
Introduction
Types of Smoking
The Difference between Curing and Smoking
Meat Curing and Smoking
Types of Smokers

16. Thermal Food Preservation
Introduction
Effect of Preservation Temperatures
Effect of Processing on Nutrients in Foods
Thermal Preservation Methods

17. Machinery & Equipments (Photographs)
Directory Section

About NIIR

NIIR PROJECT CONSULTANCY SERVICES (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services.
NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.


NPCS also publishes varies process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.