The alcoholic and non alcoholic beverages are being used by human being since centuries back. Accompanying the increase in the variety of consumption there has been a parallel increase in the variety of alcoholic and non alcoholic beverages offered for sale. The alcoholic drinks market is broadly classified into five classes, starting from beers, wines, hard liquors, liqueurs and others. Similarly non alcoholic drinks market is broadly classified into carbonated drinks, non carbonated drinks and hot beverages. These include juices, energy drinks, carbonated drinks, tea, coffee and bottled water. The commercial success of a soft drink formulation depends upon a number of factors. A strong, well placed advertising campaign will bring the consumer to purchase the new product but, thereafter, the level of repeat sales will reflect the degree of enthusiasm with which the new drink has been received. The dramatic growth of fruit juice and non carbonated fruit beverage markets worldwide has been made possible by the development of new packs and packing systems and improvements in traditional packaging. Tropical fruits are the newest arrivals on the juice and fruit beverage market. Whisky is the portable spirit obtained by distillation of aqueous extract of an infusion of malted barley and other cereals that has been fermented. It can be considered as the product of distillation of an unhopped beer. Beer is the world most widely consumed alcoholic beverage; it is the third most popular drink overall, after water and tea. Rum is a distilled alcoholic beverage made from sugarcane by products such as molasses, or directly from sugarcane juice, by a process of fermentation and distillation. The Indian alcoholic market has been growing rapidly for the last ten years, due to the positive impact of demographic trends and expected changes like rising income levels, changing age profile, changing lifestyles and reduction in beverages prices.

Some of the fundamentals of the book are flavourings and emulsions, syrup room operation, fruit juices and comminuted bases, acids, colours, preservatives and other additives, high intensity sweeteners, packaging systems for fruit juices and non carbonated beverages, grape juice processing, processing of citrus juices, juice processing for pasteurized single strength, equipment for extraction and processing of soft and pome fruit juices, chemistry and technology of citrus juices and by products, legislation controlling production, labelling and marketing, biochemical events during brewing fermentations, outline of the whisky producing process, types of beer brewed, aroma compounds of rum and their formation, cider and perry etc.

The alcoholic and non alcoholic beverages described in this book are beer, wine, rum, whisky, cider and different types of fruit juices with packaging systems and other relevant parameters related to their manufacturing. The book will be very helpful to technocrats, new entrepreneurs, research scholars and for those who are already in to this field.
## Contents

1. CARBONATION AND FILLING
   - Introduction
   - Carbonation
     - The nature and effects of carbonation
     - Properties of carbon dioxide
     - Equilibrium pressure
     - Measurement of carbonation
     - Carbonation determination
   - Carbonators
     - Designs of carbonators
     - Air exclusion
     - Proportioners
   - Fillers and Filling Valves
     - Basic filling valve operation
     - Filling valve development and the influence of ambient filling

2. EFFECTIVE APPLICATION OF QUALITY CONTROL
   - Introduction
   - Evolution of QC in the Soft Drinks Industry
   - Concept of quality
   - Evolution of soft drinks QC
   - The Small-to-Medium-Sized Business
     - Contract packing
     - Setting up a cost-effective system for QC
   - Product and packaging innovation
   - National Operations with Multiple Plants
     - Impact of industry concentration
     - Organisation of QC at plant level
     - Centralised organisation for quality
     - Bottling versus canning QC requirements
     - Equipment selection for quality
     - Development of in-line quality-monitoring equipment
     - Potential quality problem areas
     - Product recall
     - Water quality and treatment
     - Statistical QC
     - Microbiology
     - Dispensed soft drinks
     - International QC and QA of Soft Drink Operations
       - The franchise system
     - Technical services
     - The international quality assurance laboratory
     - Ingredient quality
     - Packaging quality
     - Trouble-shooting the theory in practice
   - The Future
     - Influence of packaging
     - New ingredients formulation and sanitation requirements
     - Role of the soft drinks associations
   - The final word
3. FLAVOURINGS AND EMULSIONS

- Flavourings
- Legislation
- Creation
- Production
- Emulsions
- Manufacture
- Application of Flavourings and Emulsions

- Selection
- Methods of use
- Evaluations

4 SYRUP ROOM OPERATION

- Introduction
- Syrup Room Design
  - Wall finishes
  - Floors and drainage
  - Ceilings and lighting
  - Heating, ventilating and air conditioning
- Syrup Room Equipment
  - Storage, mixing tanks and systems
  - Pipework, fittings and connections
- Ingredient flow
  - Pumps
  - Measurement of liquid
  - Filtration of ingredients
  - Ultraviolet sterilisation
  - Pasteurisation
  - Homogenisation
- Syrup Room Materials Storage and Handling
  - Sugar
  - High-fructose glucose (Corn) syrup
  - Acids
  - Sweeteners
  - Preservatives
  - Flavourings
  - Colours
  - Fruit juices and comminuted bases
- Syrup Room CIP Systems and Detergents
  - Design of a CIP unit
  - Rate of flow in pipelines for CIP
  - Calculation of reynolds number
  - Choice of detergents
  - Automaton and computerisation in syrup rooms
  - Typical system description
  - Typical operating sequence for syrup manufacture
- Multiple Component Mixing Plant
  - Construction
  - Control and operation
  - Future Developments

5 ACIDS, COLOURS, PRESERVATIVES AND OTHER ADDITIVES

- Introduction
- Acids
Carbonic acid
Citric acid
Tartaric acid
Phosphoric acid
Lactic acid
Acetic acid
Malic acid
Fumaric acid
Ascorbic acid
Colours
Preservatives
Micro-organisms and soft drinks
Sulphur dioxide
Benzoic acid and benzoates
Esters of para-hydroxy-benzoic acid
Sorbic acid and sorbates,
Other Additives
Emulsifiers
Stabilisers
Saponins
Anti-oxidants
The Safety of Food Additives
6. HIGH-INTENSITY SWEETENERS
Introduction
Use of Intense Sweeteners
Current Sweeteners
Acesulfame K
Aspartame
Cyclamate
Saccharin
Stevioside/Stevia
Thaumatin
Dihydrochalcones
Potential New Sweeteners
Alitame
Sweetener Approval and Regulation
Future Use of Intense Sweeteners
7. CARBOHYDRATE SUGARS
Introduction
History
Carbohydrate Sugars
Granulated sugar
Liquid sugar
Glucose syrup: high-fructose syrup
Quality
Trade requirement
Quality assurance management
Sugar analysis
Transportation and Delivery
Bulk delivery of granulated sugar
Bulk delivery of Liquid carbohydrate Sugars
Security of delivery
Storage
Granulated sugar in bags
Granulated sugar in bulk
Liquid carbohydrate sugars
On-site Dissolving of Granulated Sugar
Batch dissolving
Continuous dissolving
High-capacity dissolving

8. PACKAGING SYSTEMS FOR FRUIT JUICES AND NON-CARBONATED BEVERAGES
Introduction
The Fresh Cold Fill System
The Hot Fill System
Filling Equipment for Gable Top Cartons
Packing Materials for Gable Top Cartons
Product Protection and Product/Pack Interaction
General considerations
Cold filled juices
Hot filled juices
Flavour
Packaging of Frozen Concentrated Juices (FCJ)
Filling in Glass Containers
Plastic Containers and Pouches

9. GRAPE JUICE PROCESSING
History of Grape Juice Processing in North America
Grape Cultivars
The Chemistry of Grape Juice
Carbohydrates
Acids
Mineral content
Phenolic
Volatile
Modern Grape Juice Processing
Harvesting/ripening
Stemmer/crusher operation
Hot-break process
De-juicing/pressing operation
Coarse filtration
Bulk storage and tartrate precipitation
Enzyme clarification
Polish (fine) filtration
Hot fill
Process Alternatives
Cold-pressing
Aseptic process
Concentration
Sulfur dioxide preservative

10. PROCESSING OF CITRUS JUICES
Introduction
Fruit Harvesting and Transport
Unloading and Storage of Fruit
Fruit Transfer from Storage Bins to Extractors
Juice Extraction and Finishing
Extractors
Finishing
Juice Processing for Pasteurized Single Strength
Juice Processing for Concentrate
Characteristics of 1950s evaporators
Modern evaporators for citrus fruit
Essence Recovery
Chilled Juice from Concentrate
Pulp Wash
Frozen Pulp Processing
Manufacture of Citrus Cold Pressed Oil
Manufacture of Livestock Feed from Citrus Peel
Peel dryer
Waste heat evaporator
11. APPLE JUICE
General Background
Juice extraction
Pomace disposal
Blending and packaging
Natural Style Juices
Clarified Juice and Concentrate
Enzyming
Pulp enzyming
Fining
Concentrates
Hazes and deposits
Authentication and Adulteration
Composition of Apple Juice
Sugars and sorbitol
Starch & pectin
Organic acids
Protein and amino acids
Polyphenols and colour
Minerals
Volatile components
Other flavour aspects
Microbiology
Food Tests
Test for the presence of pectin in clarified Juice
Test for the presence of starch
Test fining with gelatin
Test fining with gelatin/kieselsol
Test for overfining
12. EQUIPMENT FOR EXTRACTION AND PROCESSING
OF SOFT AND POME FRUIT JUICES
Introduction
Modern juice processing methods
Juice Extraction Systems
Fruit storage and handling
Milling
Pressing
Comparison of pressing systems
European grape pressing
Pre-treatment with Pectolytic Enzymes
Post-press Clarification
Decantation
Centrifugation
Earth filtration
Rotary vacuum filters
Sheet filtration
Cartridge filters
Membrane filtration
Concentration/Aroma Recovery
Rising film evaporators
Falling film evaporators
Centrifugal evaporators
Heat recovery from evaporated water
Aroma recovery
Pasteurisation
Flash pasteurisation
Batch pasteurisation
In-pack pasteurisation/hot filling
Fruit Juice Plant Layout
Materials of construction
Fruit reception
Handling and washing fruit
Seasonal problems
Effluent treatment
Juice storage
Summary

13. CHEMISTRY AND TECHNOLOGY OF CITRUS JUICES AND BY-PRODUCTS
Principal Citrus Cultivars
Origin of citrus
Commercial citrus regions
Citrus growing areas
Effect of frost
Effect of soil
Composition and Structure of Citrus Fruits and Juices of Various Cultivars
General relationship
Organic acids
Carbohydrates
Color pigments
Vitamins and inorganic constituents
Flavonoids
Lipids
Operational Procedures and Effects on Quality and Shelf Life of Citrus Juices
Outline of good manufacturing and processing procedures
Concentrate handling for reprocessing and/or reconstruction
Sanitation or stabilization
Water for reconstitution use
Processing of chilled high and low pulp reconstituted orange juice
Finished product handling and storage
Citrus Juice Flavor Enhancement with Natural Citrus Volatiles
Components of citrus juice flavor
Citrus flavor enhancement technology
Citrus oils and aroma and their recovery
Pectic Substances and Relationship of Citrus Enzymes to Juice Quality
Effect of Time, Temperature and other Factors on Citrus Products

14. LEGISLATION CONTROLLING PRODUCTION, LABELLING AND MARKETING
Fruit Juices, Concentrated Fruit Juices and Fruit Nectars, Introduction
Fruit juice regulations in EEC countries
Fruit juice regulations in the United States and Canada
Fruit juice regulations in other major countries
Fruit juice standards produced by codex alimentarius
Non-Carbonated Fruit Beverages
Introduction
Fruit drink regulations in EEC countries
Fruit drink regulations in other European countries
Fruit drink regulations in the United States and Canada
Fruit drink regulations in other major countries

15. TROPICAL FRUIT JUICES
Introduction
Guava
Mango
Passion fruit
Pineapple
Other Tropical Fruits
Acerola
Banana
Kiwifruit
Lulo
Papaya
Soursop
Umbu
Tropical Fruit Juices in Europe Today
The Future

16. WHISKY 418
Introduction
History of Whisky Production
Outline of the Whisky-producing Process
Individual Operations
Raw materials
Mashing and cooking
Fermentation
Distillation
Maturation and ageing
Blending and colouring
Effluent disposal and spent grains recovery
Organoleptically Important Components of Whisky
Concentrations of organoleptically important compounds
Chemical nature of organoleptically important compounds
Contribution of compounds to organoleptic properties
Origin of organoleptically important compounds

17. BEER
Introduction
Historical Aspects of Brewing
Prehistoric and early historic
Brewing in Europe
Outline of the Brewing Process
Malting
Suitability of barley for brewing
the malting process
Kilning
Mashing
Brewing liquor
Mash-tun ingredients other than malt
Mashing systems
Enzymolysis in the mash tun
Sparging
Direct Conversion of Barley to wort
Wort Boiling and Cooling
General
Hops and hopping
Wort clarification and cooling
Fermentation
Brewing yeasts
Biochemical events during brewing fermentations
Physical behaviour of yeast
Fermentation systems
Beer Treatments
Maturation and conditioning
Haze prevention
Yeast removal
Pasteurization
Post-fermentation bittering
Beer Properties
Colour and clarity
Foam
Flavour and aroma
General composition and dietary value of beer
Beer Defects
Gushing
Microbiological spoilage
Oxidation flavour, stale flavour and other off-flavours
The State of the Industry
Types of beer brewed
18. RUM
Introduction
Production of Rum
Types of rum and the raw materials used
Pretreatment of the raw materials
Fermentation
Distillation
Maturing
Aroma Compounds of Rum and their Formation
Higher alcohols
Fatty acids
Esters
Phenolic compounds
Nitrogenous compounds
Sulphur-containing compounds
Lactones
Carbonyl compounds

19. TABLE WINES

Introduction
Some Economic Aspects of the History of Wine Making
Grapes
Must Treatment
Alcoholic Fermentation
Post Fermentation Operations
Microbiological Stabilization
Malo-lactic fermentation
Microbiological spoilage,
Sulphur dioxide addition

20. CIDER AND PERRY

Introduction
Definition of cider and perry
Outline of the process of cidermaking
Historical aspects
Composition
Juice
Fermentation and storage
Disorders
Technology
Fruit supply
Juice production
Juice treatment
Fermentation and storage
The final cider
Ancillary products

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.