

Food Flavours Technology Handbook

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No doubt flavour is one of the most important attributes of the food products we eat in our daily life. Man does not eat simply to live but even more so lives to eat. Flavourings are focused on altering or enhancing the flavours of natural food product or creating flavour for food products that do not have the desired flavours for example bakery goods and other snacks. Flavour is generally defined in terms of three components; odour, taste and texture. Its characterization is concern with the similarities in human flavour perception using methods that designed to average out the differences. The flavour of foods may be classified as natural flavour (pre existing in diet particularly in fruits, vegetables and spices), process flavour (arising in end products as a result of conventional processes), compounded flavour (intentionally added flavouring), taste modifiers and abnormal taste and taints. Some of the flavouring materials produced by processing are chocolate, cheese, blue cheese, yogurt, wine, aroma chemicals etc. The flavour industry has become a vital element in the growth and success of food and beverage industries worldwide. The flavours industry remains very country specific and complex, with product formulations and flavours varying from country to country, as well as from region to region within countries. Processed foods, their flavours and textures, are adapted to local consumer preferences. Local or traditional foods have unique flavours evolving from the indigenous climate, land, etc. Generally speaking, trends in flavours closely mirror those in the packaged food and drink market. This includes the trends toward premium quality, savoury, natural and authentic, and health and wellness. The global flavour industry can be characterized as highly technical, specialized, and innovative. This industry is highly competitive and concentrated, compared to other product categories within the food and beverage market. The global flavours market is predicted to grow at a Compound Annual Growth Rate (CAGR) of 2% per annum.

This book majorly deals with flavour in fruits and vegetables, additional pathways for vegetable flavour, change in food flavour after processing, flavours formed via fermentation, odd flavours in foods, odd flavours due to chemical changes in the food, relationships between the food and flavour manufacturers, flavour characters of herbs preparation of herbs for marketing, flavour constituents of grapes and wine, dried inactive yeast powder, synthetic flavouring materials, flavour potentiators, baked goods and bakery products, sugar and chocolate confectionery, techniques of sensory testing, fruit based products, gas chromatography, microbiological analysis

The present book contains formulae, processes of various flavours applied in food and beverage industries. This book is intended to be a practical companion to the flavourist, technologists, entrepreneurs, libraries or for those who are already in the field of manufacturing.

1. Flavour Characterization

Psychophysics

Flavour Chemistry

2. Flavour in Fruits and Vegetables

Fruit Aroma

Flavours from Fatty Acid Metabolism

Flavours from Amino Acid Metabolism

Flavours Formed from Carbohydrate Metabolism

Flavour Formation from Cysteine Sulfoxide

Derivatives

Flavour Formation from Glucosinolates

Additional Pathways for Vegetable Flavour

Formation

Location of Flavour in Plant

Plant Foods

Genetics

Environmental Effects on Flavour Development

Influence of Maturity on Flavour Development

Effects of Postharvest Storage Conditions on

Flavour Development

Animal Products

3. Change in Food Flavour after processing

Non-enzymatic Browning

General Overview of Non-enzymatic Browning

Factors Influencing Browning Rate

Formation of Flavour Compounds

Carbonyls

Pyrazines

Pyrroles

Pyrroles

Pyridines

Miscellaneous Nitrogen Heterocyclics

Furanones and Pyranones

Sulfur Heterocyclics

Oxazoles and Oxazolines

Flavours from Lipids

Deep Fat Fried Flavour

Lactones

Secondary Reactions

Flavours Formed via Fermentation

Esters

Acids

Carbonyls

Alcohols

Terpenes

Lactones

Pyrazines

Conclusion

4. Odd Flavours in Foods

Environmental Contamination

Airborne Sources

Waterborne Sources

Disinfectants, Pesticides, and Detergents

Packaging Sources
Odd-Flavours Due to Genetics or Diet
Genetics
Diet
Odd Flavours Due to Chemical Changes in the Food
Lipid Oxidation
Nonenzymatic Browning
Photo-Induced Odd-Flavours
Microbial Odd-Flavours
5. Flavours and Flavouring Materials
Food Acceptance
Taste
Odour
Flavour materials
Natural Flavourings
Artificial Flavourings
Progressive Use of Synthetics
Typical Synthetics
Compounding
Flavour Precursors
Flavourings in Foods
Added Flavourings
Compounded Flavourings
Flavouring Materials
Solid Flavouring Materials
Liquid Flavouring Materials
Semi-fluid or Paste Flavouring Products
The Flavour Industry
Relationships between the Food
and Flavour Manufacturers
6. Isolation of Food Flavours
Headspace Method
Direct Injection
Adsorbent trapping
Isolation of Flavours by Distillation Methods
Equipment and Procedures
Solvent Selection
Solvent impurities
Solvent Extraction of Fatty Foods
Isolation of individual Classes of Volatile Flavours
Sulfur Compounds
Acids
Alcohols
Carbonyls
Amines
Concentration of Dilute Organic and Aqueous
Flavour Isolates
Evaporation
Freeze Concentration
Adsorption
Flavour Analysis by Direct injection
Gas Chromatography
Fractionation of Flavour Isolates

Gas Chromatography of Flavour Concentrates

Capillary Column GC

GC Detectors

7. High Resolution Infrared Spectra of Some
Naturally Isolated Food Flavours

8. Flavouring Materials of Natural Origin

Natural Flavours and Flavourings:

Sources of Natural Flavouring Materials

Standards of Purity

Sensory Assessment

Flavour Profiles

Spice Importation

Herbs and Spices

Herbs

Spices

Historical Associations

Commercial Considerations

Relationships of Components and Profiles

Classification of Herbs and Spices

Flavour Characters of Herbs

Preparation of Herbs for Marketing

Production and Economic Aspects

Recent Developments

Specifications Analysis and Quality

Purchasing and Processing

Use of Spices

Individual Spices

Anise Seed

Basil Sweet Basil

Bay Laurel Leaves.

Benne Also Benni or Bene

Capsicum.

Caraway Seed

Cardamom Seed

Cayenne

Celery Seed

Chilli Powder

Chilies

Cinnamon

Cloves

Coriander Seed

Cumin Seed

Curry Powder

Dill Seed

Fennel Seed

Fenugreek Seed Foenugreek

Garlic Powder

Garlic Salt

Ginger

Mace

Marjoram (Sweet Marjoram)

Mint

Mustard

Nutmeg
Onion Powder
Onion Salt
Oregano
Parsley (Parsley Flakes)
Parsley Seed
Pepper, Black
Pepper, White
Poppy Seed
Red Pepper
Rosemary
Saffron
Sage
Savory Summer Savory
Sesame Seed Benne, Benni, or Bene Seed
Tarragon Estragon
Thyme
Turmeric Curcuma
Vanilla
Spice Processing-Milling
Microbiology of Spices
Gas Sterillization of Spices
Spice Essential Oils
Distillation of Volatile Oils
Gamma Irradiation
Spice Essential Oils
Application of Spice Essential Oils
Essential Oil Content of Spices
Extraction and Oleoresins
Solvents
The Extraction Process
Quality of Oleoresins
Application of Oleoresins
Seasonings
Flavour Index and Formulation
Plants as Sources of Essential Oils
Citrus Fruits
Processed Citrus Oils
Other Citrus Peel Oils
Citrus Leaf and Flower Oils
Peppermint
Spearmint
Blended Peppermint Oils
Composition of Mint Oils
Other Commercially Important Sources
Fruit, Fruit Juices and Concentrates
Classification of Fruits
Fruit Juice and Flavour
Fruit Juice Extraction
Preservation of Fruit Juices
Concentrated Fruit Juices
Recovery of Aromatics
Brix Value

Blending of Fruit Juices-WONF
Depectinized Juices
Dehydrated Fruit Juices
Fruit Pastes and Comminutes
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The Vanilla Plan
The Curing Process
Classification and Grading of Vanilla Beans
The Flavour of Vanilla
The Chemistry of Vanilla Flavour
Precursors and the Development of Flavour
during Curling
Vanilla Absolute
Vanilla Sugar
Authenticity of Vanilla Extracts
Vanillin and Ethyl Vanillin
Beverage Flavours
Cacao (Cocoa)
The Flavour of Cocoa
Chocolate
Coffee
The Flavour of Coffee
Caffeine
Tea
Onion
The Flavour of Onion
Dehydrated Onion
The Flavour of Garlic
9. Chemical Modification of Turmeric Oil to
more value added products
Results and Discussion
Conclusion
Experimental
Reduction of turmerones to turmerols:
Acetates of turmerols:
Propionates of turmerols:
Butyrates of turmerols
Catalytic hydrogenation of turmerones
Reduction of dihydro-turmerones to dihydro-
turmerols
Acetates of dihydro-turmerols
Propionates of dihydro-turmerols
Butyrates of dihydro-turmerol
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10. Flavouring Materials made by Processing
Natural Products Made by Roasting:
Cocoa/Chocolate
Production of Cocoa Powder
The Dutch Process
Chocolate
Reaction Flavours:
Imitation Meat Flavours
Imitation Meat Flavours

Hydrolyzed Vegetable Protein-H VP
Autolyzed Yeast Extract
Enzymatically Derived Flavourings: Butter, Cheese
Butter
The Flavour of Butter
Enzymatic Production of Butter Flavours
Butter Oil
Cheese
Cheese Flavour
Cheddar Cheese Flavour
Blue Cheese Flavour
Enzyme-Modified Cheese (EMC)
Lactic Acid Fermentation-Yogurt
Yogurt Flavour
Flavourings for Yogurt
Flavours Made by Fermentation
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Vinegar/Actetic Acid
Wines
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Flavour Constituents of Grapes and Wine
Dried Inactive Yeast Powder
Biotechnology: Production of Aroma Chemicals
Micro-organisms in Flavour Formation
Flavours Made by Pyrolysis: Smoke Flavours
The Smoking of Foods
Natural Liquid Smoke Flavourings
Pyroligneous Acid
Smoke Condensates
Chemistry of Smoke Flavours
Flavour Chemicals
Colour Compounds
Polycyclic Aromatics
Methods of Application
11. Synthetic Flavouring Materials
Imitation Flavourings:
Matching Nature
Synthetic Organics
Quality Control
Consumer Attitudes toward Synthetic Chemicals
Classification of Flavourants by Molecular Structure
Sensory Characters of Organics
Hydrocarbons
Carboxylic Acids
Acetals
Alcohols
Carbonyls
Ketones
Esters
Heterocyclic Compounds
Ketals
Lactones

Nitrogen-Containing Compounds

Amines

Imines

Amino Acids

Isothiocyanates

Phenols

Sulfur-Containing Compounds

Sulfides

Solvents

Extraction Solvents

Nomenclature of Organic Chemicals

12. Flavour Potentiators

Chemical Properties

Structure

Stability

Sensory Properties

Influence on Taste

Influence on Aroma

Synergism

Mode of Action

Flavour Potentiators in Foods

Naturally Occurring

Added to Foods

Source of Commercial Potentiators

Toxicity

Monosodium Glutamate

Other Potentiators

13. Application of Flavouring

Flavours in Foods

Achieving Flavour Balance

Consumer Acceptance

Flavour Defects

Flavour Intensification

Flavour Suppression

Criteria for Application of Flavourings

Acceptability to the Consumer

Legal Acceptability

Nature of Product as Sold and as Consumed

Processing Conditions

Available Flavourings

Processing Parameters

Temperature and Time

Open or Closed System

The Mixing Sequence

Pressure

Contact with Air

Specific Flavouring Applications

Meat Products

Baked Goods and Bakery Products

Snack Foods

Baked Goods and Bakery Products

Sugar and Chocolate Confectionery

Soft Drinks

14. Flavour Production

Liquid Flavourings

Emulsions

Dry Flavourings

Extended or Plated Flavours

Phase Separation/Coacervation Processes

Addition and Mixing

Emulsification

Solidification and Hardening

Separation

Washing

Drying

Dehydration Processes

Emulsification

Dehydration

Extrusion

15. Sensory Testing Method

Test Purpose and Objectives

Applications

Panel Selection and Indoctrination

Types of Judges

Eligibility

Indoctrination

Panel Morale

Conditions of Testing

Techniques of Sensory Testing

Sample Handling

Sample Carriers

Sample Presentation.

Sample Coding

Testing Methods

Analysis and Reporting of Test Results.

Directional Triangle Tests

Paired Difference Testing

Paired Intensity Testing

16. Quality Control

Natural Plant Materials

General tests

Tests of limited application

Additional specific tests

Essential Oils

General tests

Tests of limited application

Instrumental tests

Specific tests for constituents

Tests specific for citrus oils

Oleoresins

General tests

Specific tests

Plated or Dispersed Spices

General tests

Tests of limited application

Synthetic Chemicals

General tests-liquids
General tests-solids
Specific tests for chemical identity and
purity-Instrumental methods
Flavourings
General tests-liquid flavourings
General tests-emulsions
General tests-encapsulated dry flavourings
Vanilla Extract
Fruit-Based Products
General tests
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Specific Gravity
Refractive Index
Optical Rotation
Alcohol Content
Residual Solvent
Particle Size of Emulsions
Volatile Oil
Surface Oil
Moisture Content
Gas Chromatography
Microbiological Analysis

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business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

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