

The Complete Technology Book on Starch and Its Derivatives

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Starch is a group of poly saccharides, composed of glucopyranose units joined together by glucosidric linkages. Starch is also metabolized for energy in plants and animals, and is used to produce a large number of industrial products. Starch is processed to produce many of the sugars in processed foods. The biggest industrial non food use of starch is as adhesive in the paper making process. Other important fields of starch application are textiles, cosmetic and pharmaceutical uses. Starch can be obtained from maize, sorghum, roots and tubers such as tapioca, arrow root, potatoes etc. Starch truly serves as a multifunctional ingredient in the food industry. Starch is one of the most present biomaterials has witnessed significant developments over the years. By products are obtained in the manufacture of different types of starch such as maize gluten has a number of interesting possible uses in industry, zein (by product of corn processing) is used in the preparation of stable glass like plastics, modification of zein is used as adhesives and in the preparation of coating compositions for paper, the most important by product from wheat starch manufacture is gluten which is used in preparing diabetic foods, for feeding cattle, thickening agent in textile printing and so on. The Global starch market is likely to get respite from deceleration in its market growth, with growth poised to receive a new lease of life in the next few years.

This book basically illustrates about the properties, structures, manufacturing process explained with flowcharts and diagrams, applications of starch and its derivatives etc. The major contents of the book are structure and chemical properties of starch, chemical composition, molecular structure, starch granule properties, water sorption and granule swelling as a function of relative humidity, factors affecting starch paste properties, the oxidation of starch etc.

This is a unique book, concise, up to date resource offering a valuable presentation of the subject. This book contains processes of starch and its derivatives. This book is an invaluable resource for new entrepreneurs, industrialists, consultants, libraries.

1. Structure and Chemical Properties of Starch

Structure and Properties

Chemical Composition

Molecular Structure

Starch Granule Properties

Water Sorption and Granule Swelling as a
Function of Relative Humidity

Factors Affecting Starch Paste Properties

2. The Swelling And Gelatinisation of Starch

The Swelling of Starch

The Gelatinisation of Starch

The Use of Swelling Agents to Study Gelatinisation

Methods of Following the Course of

Gelatinisation of Starch : Optical Methods

Methods Depending on Viscosity

The Effect of Injury to Starch Granules before

Gelatinisation on the Properties of the Pastes

Viscosity and Structure

The Rigidity of Starch Pastes

3. The Role of the Minor Constituents of Starch

The Role of Phosphorus in Starch

The Formation of 'Werner Complexes'

The Adsorption Theory

The Amylophosphoric Acid Theory

The Significance of Nitrogen in Starch

The Coacervation Theory

Fatty Acids Present in Certain Starches

Other Acids Present in Starch as Esters

4. The Retrogradation of Starch

'Retrogradation' of Starch by Freezing

'Retrogradation' by Solvents

Monomolecular Dispersion

Complete Retrogradation

The Explanation of Retrogradation

Practical Significance of Retrogradation in Industry

The Prevention of Retrogradation

Reactions with Formaldehyde

5. Starch and the Hydrogen Bond

6. The Reaction of Starch with Iodine

The Effect of Heat

Sensitivity of the Reaction

An Abnormal Starch-Iodide Reaction

The Composition of Starch Iodide

Use of Starch Iodide

The Starch-Iodide Reaction in the Spectro-photometric

Determination of Starch

7. Root Starches

Manufacture of Potato Starch

Refining the Starch

Drying the Starch

Some Difficulties Occurring in the Manufacture of Potato Starch

Cassava Starch or Brazilian Arrowroot

The Manufacture of Sweet-Potato Starch

8. Cereal Starches

The Manufacture of Wheat Starch

Manufacture of Maize Starch

Early Process. Extracting the Starch

Treating the Starch

Drying

Modern Process

Rice Starch

9. The Oxidation of Starch

OXIDATION OF STARCH IN ACID MEDIA

Oxidation by Nitric Acid

Oxidation by Ammonium Nitrate

Oxidation by Chromic Acid

Oxidation by Permanganates

Oxidation by Hydrogen Peroxide

Oxidation by Halogens

Oxidation by Oxy-halogen Acids

Oxidation by other Per-compounds

Oxidation by Oxides in Acid Solution

Oxidation by Irradiation

Oxidation by Air in Acid Solution

Oxidation by Ozone

OXIDATION OF STARCH IN ALKALINE MEDIA

Oxidation by Hypohalites

Oxidation by Alkaline Chlorite

Oxidation by Alkaline Aktivin

Oxidation by Alkaline Permanganates

Oxidation by Alkaline Peroxides

Oxidation by Air in Alkaline Solution

Electrolytic Oxidation

Oxidation by Alkaline Mercuric Oxide

Oxidation by Alkaline Persulphates

OXIDATION OF STARCH IN NEUTRAL MEDIA

Oxidation by Bromine

Oxidation by Iodine

10. Glucose and Maltose

The Manufacture of Glucose

Raw Materials

Earlier Process

The More Recent Process

The Crystalline Forms of Anhydrous Dextrose and
Dextrose Hydrate

Producing Anhydrous Dextrose

Uses of Glucose

The Manufacture of Maltose

11. Ethyl Alcohol and Acetone

The Manufacture of Ethyl Alcohol

The Amylo Process

The Production of Acetone

12. Dextrin and British Gums

Methods of Manufacture

Raw Materials

The Choice of Acid

Pre-treatment of Starch before Torrification

Main Steps in Dextrin Manufacture

Addition of Catalyst

Maturing the Starch

Drying the Starch before Roasting

The Roasting Process

Cooling and Re-moistening the Dextrin

Grinding and Bagging-off Operations

Conversion of Starch to Dextrin by the Wet Process

Acid Conversion in the Wet Process

The Conversion using Enzymes

13. Modified Starches

Physical Treatment to Modify Starch

14. Adhesives from Starch and Dextrin

Purpose and Applicability

The Application of Adhesives

Theoretical Considerations

Flour Pastes

Adhesives from Starch

Treatment with Caustic Alkalies

Treatment with other Alkaline Substances

Treatment with Acids

Treatment with Salts

Treatment with Oxidising Agents

Treatment of Starch with Swelling Agents

Addition of Various Compounds to Starch Adhesives

Dextrin Adhesives

15. The Foodstuff Industry

Potato Products in the Food Industry

Importance of the Storage History of Potatoes

Colour of Potato Chips

Cooking other than Frying

The Gelatinisation of Starch

The Effect of Various Factors on Gel-Strength of Starch Pastes

Uses of Starch on Various Foodstuff Preparations

Starch in the Baking Industry

Moisture Absorption by Dough

The Influence of Other Physical Properties of

Starch on Baking Quality

The Diastatic Activity of Flours

The Chemistry of certain Baking Faults

16. The Paper Industry

ENGINE SIZING

Tub Sizing

Coated Papers

Miscellaneous

17. The Textile Industry

Sizing of Yarns

Sizing

Considerations influencing Sizing

Mechanical Properties of Starch Films and

Sized Cloths Arranged in Order of Decreasing Magnitude

The Effect of Auxiliary Agents on the

Properties of Sizes and Finishes

Desizing

Enzymes

The Use of Enzymes in Desizing

The Finishing of Textile Fabrics

Adhesive Dressings

Characteristics of Individual Starches

Wheat Flour

Tinting and Blueing Agents
The Suitability of Starches and Dextrins
The Printing of Textile
Function of the Thickener
Colour Value
Starch Products used for Thickenings
Disadvantages attendant on the Use of Starch Thickenings
Thickenings of British Gums
18. Miscellaneous Uses of Starches and Dextrins
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Laundry Starches
Cosmetic and Pharmaceutical Uses
Horticultural Uses
Fire-Proofing Preparations
Explosives and Fuels
Some Unclassified Uses
19. Utilisation of the By-Products of Starch Manufacture
20. Antiseptic Agents and Preservatives
21. General Features and Nomenclature of Amylases
Occurrence
Composition
22. Preparation of Enzymes used in the Starch Industry
Enzymes from Malt
Preparation of Individual Malt Enzymes
Enzymes from Moulds or Fungi
Enzymes from Animal Juices
Bacterial Enzymes
23. The Action of α -Amylase on Starch
Soluble Starch
HYDROLYSIS OF STARCH BY α -AMYLASE
 α -amylodextrin
Amyloamylose
Erythro Bodies
 α - and β -Glucosides
The Mode of Action of α -amylase
24. Analysis of Starch and its Derivatives
General Methods of Analysis
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ANALYSIS OF STARCH DERIVATIVES
ANALYSIS OF STARCH HYDROLYZATES
Dextrose
Saccharide Contents of Acid-Converted Starch Hydrolyzates
Reducing Sugars
Schoorl Method : Conversion of Titer Difference to Reducing Sugar
Assay by Specific Gravity
Conversion of Commercial Degrees Baumé to % Dry
Substance for Commercial Corn Syrups and Dextrose Solutions
Trace Components
Calcium
Copper
Iron
Chloride
SULFATE

ANALYSIS OF FEED PRODUCTS

Starch

Crude Fiber

Lactic Acid

Xanthophylls

ANALYSIS OF CORN OIL

Iodine Value

Peroxide Value

Free Fatty Acids

Color

Cold Test

Smoke Point

25. List of Material Suppliers

List of Chemical Suppliers

LIST OF MACHINERY / EQUIPMENT SUPPLIERS

About NIIR

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