

# The Complete Book on Water Soluble Gums and Resins

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Resins, gums and latex are almost ubiquitous in the plant kingdom and many of them continue to play an important role in our daily lives. Numerous plants produce some kind of resin, latex or gum, but only a few are commercially important today, even though their uses and applications are truly manifold. They have been used as adhesives, emulsifiers, thickening agents, they are added to varnishes, paints and ink; they lend their aromas to perfumes and cosmetics and even play a role in pharmacy and medicine. Gums are viscous substances which are secreted by the bark of certain trees. Usually transparent (but sometimes slightly tinted) they contain a mucilage which when dissolved in water makes the latter become viscous. When this mucilage is dissolved in water it can be made to precipitate with alcohol. Resins, on the other hand, are gluey and viscous substances which may be whitish, brownish, or red and are secreted by certain trees when they are incised. Resins contain an essence and are usually not water soluble. Most commonly found types of plant exudates are chemically completely different to gums. Several acacia species are important economically. True gums are complex organic substances mostly obtained from plants, some of which are soluble in water and others of which, although insoluble in water, swell up by absorbing large quantities of it. They are used in adhesives, pharmaceuticals, inks, confections, and other products. Resins are terpene based compounds. Terpenes constitute one of the largest groups of plant chemicals and they can be very complex. They are not water soluble, but can be either oil soluble or spirit soluble, depending on their specific chemical composition. Worldwide interest and activity in gums and resins has grown dramatically in the last few years. Governments, environmentalists, research institutions and other interest groups are among those who have begun to push for stronger support for gums and resins as a way to meet a range of economic, social and environmental goals.

Some of the fundamentals of the book are photosynthesis and metabolism of carbohydrates, occurrence, properties and synthesis of the monosaccharides, nitrogen derivatives, carbohydrates in parenteral nutrition, essential carbohydrates, ethers, anhydro sugars and unsaturated derivatives, constitution of nicotinic acid and of nicotinamide, industrial methods of preparing nicotinic acid and nicotinamide, general physiology, metabolism and mechanism of the vitamin action etc.

This book gives a complete insight of water soluble gums and resins that are used in day to day life in various Industries. It is an invaluable resource to all its readers, students, scientist, new entrepreneurs, existing industries and others.

## 1. CARBOHYDRATES

### 1. PHOTOSYNTHESIS AND METABOLISM OF CARBOHYDRATES

Photosynthesis

Introduction

Structural Aspects of the Photosynthetic Apparatus

Kinetic Studies on Photosynthesis

Bacterial Photosynthesis

The Hill Reaction

The Path of Carbon in Photosynthesis

The Biosynthesis of Carbohydrates by Plants

Monosaccharides

Oligosaccharides

Starch

Sugar Alcohols

Sugar Acids

Carbohydrate Biochemistry

Pathways for the Metabolism of Carbohydrates

Interconversion of the Sugars

### 2. OCCURRENCE, PROPERTIES AND SYNTHESIS OF THE MONOSACCHARIDES

Naturally Occurring Monosaccharides

Origin and Preparation of Some Naturally Occurring Monosaccharides

Synthetic Sugars

Complete Synthesis of the Sugars

Methods for Lengthening the Carbon Chain of the Sugars

Methods for Shortening the Carbon Chain of Sugars

Methods Based on Changing the Configuration of Other Sugars

Methods for the Synthesis of Deoxysugars

Preparation of Ketoses by Biochemical Oxidation of Alcohols

Aldose to Ketose Conversion Utilizing the Osones

Methods for Isotope-Labeled Sugars

### 3. OLIGOSACCHARIDES

Synthesis of Oligosaccharides

Rearrangement and Degradation of Oligosaccharides

Condensation of Two Monosaccharide Units

Determination of Structure

Ease of Acid Hydrolysis

Preparation, Properties, and Structures of Some Oligosaccharides of Natural Origin

Miscellaneous Disaccharides

Tri-, Tetra-, and Pentasaccharides

Miscellaneous Tri- and Tetrasaccharides

Enzymic Synthesis of Oligosaccharides

Synthesis of Sucrose by the Mechanism of Phosphorolysis

Synthesis of Analogs of Sucrose and Maltose by Sucrose and Maltose Phosphorylases

Synthesis of Disaccharides by Transglycosidation Through the Action of Sucrose

Phosphorylase

Synthesis of Oligosaccharides by Transglycosidation Through the Action of Hydrolytic Enzymes

Miscellaneous Oligosaccharides

### 4. NITROGEN DERIVATIVES

Glycosylamines, Nucleic Acids and Hydrolysis Products, Hydrazones, Osazones, Oximes, Amino Sugars, etc.

Glycosylamines

Unsubstituted Glycosylamines  
N-Substituted Glycosylamines  
Nucleotides  
Preparation and Structures  
Nucleoside Di- and Triphosphoric Acids  
Biologically Important Substances Related to Nucleotides  
Nucleic Acids  
Combinations of Sugars with Amino Acids and Proteins  
Preparation  
Protein-Carbohydrate Compounds as Synthetic Antigens  
Reactions of the Sugars with Substituted Hydrazines and Hydroxylamine  
Hydrazones and Osazones  
Comparison of Weygand-Reckhaus and Bloink-Pausacker Mechanisms  
Oximes  
Derivatives in which an Amino Group Replaces a Primary or Secondary Hydroxyl Group  
Amino Sugars (Glycosamines)  
Glycamines and Aminodeoxyalditols  
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Carbohydrate Sweeteners in Nutrition: Fact and Fantasy  
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Cost  
Acceptability  
Safety  
Availability, Convenience, Quality  
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Caloric Value  
Digestion and Absorption  
Starches  
Dextrins  
Maltose  
Sucrose  
D-glucose (Dextrose)  
D-fructose (Levulose)  
D-Mannose  
D-galactose and Lactose  
Lactose and the Microflora of the Digestive Tract  
?-Lactose vs. ?-Lactose  
C. Influence of the Glycosidic Linkage on the Utilization of Lactose  
Adaptation to Lactose Ingestion  
Laxative Action of Lactose  
Cataractogenic Action of Lactose  
Galactosemia Associated with Cataracts in Humans  
Lactose and Calcium Metabolism  
Cellobiose  
Rare Sugars  
Xylose Toxicity  
Sugar Alcohols (Alditols)  
Hexosamines  
Cellulose and Related Substances  
Sweetness and Flavoring Characteristics of Sugars  
Appetite for Carbohydrate

Blood Glucose and the Urge to Eat  
Synthesis of Vitamins by the Intestinal Microflora  
Protein Sparing Action  
Sugar in Candy and Carbonated Beverages  
Carbohydrates and Weight Control  
Carbohydrates in Parenteral Nutrition  
7. ESSENTIAL CARBOHYDRATES  
The Active Compounds and Their Properties  
Pathological States Caused by a Deficiency of the Active Compounds  
Specificity Studies  
The Physiological Action of the Active Compounds  
Requirements  
8. INOSITOL  
Nomenclature  
Names  
Chemical formula  
Empirical Formula  
Occurrence  
Isolation  
Properties  
Chemistry  
Industrial Methods of Preparation  
Biogenesis  
Specificity  
Determination  
Physiology of Plants and Microorganisms  
Animal Physiology  
Avitaminosis  
Hypervitaminosis  
Requirements  
9. ETHERS, ANHYDRO SUGARS AND UNSATURATED  
DERIVATIVES  
Ether Derivatives (External)  
Alkylation Methods  
Trityl Derivatives  
Anhydro Derivatives  
Methods of Preparation  
Reactions of Anhydro Sugars  
Unsaturated Derivatives  
Glycols  
Glycoseens and Alditoleens  
10. PANTOTHENIC ACID  
Nomenclature and Survey  
Names  
Probably also identical with  
Empirical formula  
Structural formula  
Chemical name  
Efficacy  
Occurrence  
Isolation  
Properties  
Chemical Constitution

Synthesis  
Industrial Methods of Preparation  
Biogenesis  
Specificity  
Determination  
Standards  
Physiology of Plants and Microorganisms  
Animal Physiology  
Avitaminosis and Hypovitaminosis  
Hypervitaminosis  
Requirements  
11. NICOTINIC ACID—NICOTINAMIDE  
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Chemical formulas  
Chemical names  
Empirical formulas  
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Isolation of Nicotinic Acid and of Nicotinamide  
Properties of Nicotinic Acid and of Nicotinamide  
Constitution of Nicotinic Acid and of Nicotinamide  
Synthesis  
Industrial Methods of Preparing Nicotinic Acid and Nicotinamide  
Biogenesis of Nicotinic Acid  
Enzyme Systems Containing Nicotinamide  
Coenzymes Containing Nicotinamide  
Mechanism of the Nicotinamide Coenzyme Action  
Specificity of Nicotinic Acid and Nicotinamide  
Determination of Nicotinic Acid and Nicotinamide  
Chemical Methods  
Biochemical Methods  
Biological Methods  
Standard of Nicotinic Acid and Nicotinamide  
Physiology of Plants and Microorganisms  
Animal Physiology  
General Physiology, Metabolism and Mechanism of the Vitamin Action  
Avitaminosis  
Clinical Test Methods  
Hypervitaminosis  
Nicotinic Acid Requirements  
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Properties and Composition  
Manufacture of Chemical Cellulose  
Specifications for Chemical Cellulose  
Methods of Analysis  
Identification  
Determination of Polymer Composition  
Determination of Carbohydrate Composition  
Determination of Noncarbohydrate Impurities  
Determination of Physical Properties  
End-use Tests  
2. DERIVATIVES OF CELLULOSE

Analysis of Cellulose Derivatives

Cellulose Nitrate

Properties

Methods of Manufacture

Methods of Analysis

Cellulose Acetate

Methods of Analysis

Cellulose acetate Butyrate and Cellulose Acetate Propionate

Properties

Methods of Analysis

Ethylcellulose

Properties

Methods of Manufacture

Methods of Analysis

Methylcellulose and Its Derivatives

Properties

Methods of Manufacture

Methods of Analysis

Hydroxyethylcellulose and Its Derivatives

Properties

Methods of Manufacture

Methods of Analysis

Sodium Carboxymethylcellulose

Properties

Methods of Manufacture

Commercial Grades and Specifications

Methods of Analysis

### 3. STRUCTURE AND MECHANICAL PROPERTIES OF CELLULOSE

Fine Structure

Internal Appearance of Fibres

Crystallinity

Orientation

Micellar and Intermicellar Structure

Mechanical Properties

Experimental Work

Correlation between Fine Structure and Mechanical Properties

Effect of Moisture

### 4. DECRYSTALLIZATION OF COTTON CELLULOSE

Methods of Decrystallization

Stability of Decrystallization

Effect of Decrystallization on the Properties of the Fibre

Mechanism of Amine Treatment

### 5. EFFECT OF CELLULOSE STRUCTURE ON TENSILE PROPERTIES OF COTTON

Degree of Crystallinity

Degree of Fibrillar Orientation

Measurement of Orientation

Effect of Orientation on Tensile Properties

Degree of Polymerization

Determination of D.P.

Effect of D.P. on Physical Properties

### 6. CREASE RESISTANCE OF CELLULOSIC TEXTILES

## IN RELATION TO FABRIC GEOMETRY

Poor Recovery in Cotton Fabrics

Background

Effect of Fabric Construction on Crease Recovery

Conclusion

## 7. MERCERIZED COTTON FIBRES

Preparation of Samples

Measurement of Crystalline Orientation

Mechanical Behaviour

## 8. ALKALI-SENSITIVE LINKAGES IN IRRADIATED CELLULOSE

Materials and Methods

Results and Discussion

## 9. HYDRATED OXIDES AS BARRIERS AGAINST ACTINIC DEGRADATION OF CELLULOSE

Experimental Procedure

Results and Discussion

## 10. HYDRATED OXIDES AS BARRIERS AGAINST CELLULOSE DEGRADATION BY ULTRA-VIOLET IRRADIATION

Experimental Procedure

Results and Discussion

## 11. SODIUM METAPERIODATE OXIDATION OF CELLULOSE AND CELLOBIOSE

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Oxidation of Cellobiose

Preparation of Derivatives

Oxidation of Cellulose

Discussion

Summary

## 12. BIOSYNTHESIS OF CELLULOSE

Synthesis in Cotton Plant

Russian Work

Cellulose Accumulation in Cotton Boll and Fibre

American Work

Microorganisms

## 13. REACTIONS OF CELLULOSE WITH CROSS LINKING AGENTS

## 14. CHEMICAL MODIFICATION OF TEXTILE CELLULOSES

Structure of Cellulose

Properties of Textile Cellulose

Elongation and Elastic Properties

Flex Life, Tear Strength and Wear Life

Wet Strength, Dimensional Stability, Wash and Crease-resistance and Drape

Bulk Density and Warmth

Lustre

Slipperiness and Resistance to Clinging

Resistance to Soiling

Permeability

Water Repellency, Absorbency, Quick Drying, Electrical Insulation and Dye-receptivity

Mildew and Rot resistance

Heat and Flame Resistance

Ion-exchange Properties

## 15. CELLULOSE ETHERS

Hydroxyethyl Cellulose

Work at Shri Ram Institute

## 16. ANTI-CREASE AND ANTI-SHRINK FINISHES FOR VISCOSE RAYONS

Resin Finishes and Formaldehyde Treatment

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Outline of the Process

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Large Scale Trials

Some Advantages

Cost of treatment

## 17. MICROBIAL DECOMPOSITION OF CELLULOSE WITH SPECIAL REFERENCE TO COTTON AND COTTON FABRICS

## 18. ROLE OF MOISTURE IN HEAT TREATMENT OF RESIN-TREATED CELLULOSIC TEXTILES

Fibre Properties and Moisture Content

Modification of Fibre Properties During Heat Treatment

Temperature and Moisture Content

Migration of Solutes and Solvents during Heat Treatment Summary

## About NIIR

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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.

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