

Gums, Adhesives & Sealants Technology (with Formulae & their Applications) 2nd Edition



Author: NIIR Board
Format: Paperback
ISBN: 9788178330952
Code: NI8
Pages: 700
Price: Rs. 1,475.00 **US\$** 150.00
Publisher: Asia Pacific Business Press Inc.
Usually ships within **3** days

Naturally occurring polysaccharides from plant exudates have been in use from many decades in immense quantities. Natural gums are natural polymers, which mainly consists of carbohydrates sometimes with small amounts of proteins and minerals. Gum and its derivatives are widely used in various industries as per its needs. The appearance and properties of natural gums determine their commercial value and end use. Due to their extraordinary, unrivalled technological & functional properties gum is used in many industries. Gums not only modify viscosity and consistency, they also often attenuate odour, taste and flavour intensity. Adhesive or sealant is a mixture in a liquid or semi-liquid state that is capable of holding materials together by surface attachment. Adhesives and sealants are used as a raw material for the manufacturing industry or for the service of different processing industries. Adhesives and sealants virtually touch every part of our lives. The adhesives and sealants are two chemically similar but functionally different groups of formulated products. There is no end in sight to the new materials, new formulation, and new uses to which adhesives and sealants will be put in the future.

Some of the fundamentals of the book are advantages of adhesive bonding, hybrids and coupling agents, adhesive films, designing polymers for adhesives, fundamentals of adhesion, designing polymers for adhesives, thermodynamics of adhesion, casein and mixed protein adhesives, lime-free casein adhesives, foil to paper laminating adhesives, casein and protein blend glues as wood adhesives, chemistry of protein blend glues, natural rubber adhesives, vulcanizing latex adhesives, solution adhesives from natural rubber, halogenated butyl rubber, butyl rubber and poly isobutylene lattices, polysulfide sealants and adhesives etc. This book covers a wide range of polymeric adhesives and sealants, gums along with their essential formularies, distinguished by applications and based on technology. The main areas covered in details are the basic fundamentals, properties, uses and applications, formulations and chemistry, methods of manufacturing and lastly testing methods. This book will be very resourceful to its readers who are just beginners in this field and also to upcoming entrepreneurs, engineers, existing industries, technologist, technical institution etc.

Contents

I INTRODUCTION TO ADHESIVES
ADVANTAGES OF ADHESIVE BONDING
HISTORY
TYPES OF ADHESIVES
Application and Setting
Origin
Cure; Solubility; Crosslinking
Hybrids and coupling Agents
Adhesive Films
High Temperature Resistance; Flame Retardance
MATCHING ADHESIVE TO ADHEREND
Critical Surface Tension
Solubility Parameter
Figure
DESIGNING POLYMERS FOR ADHESIVES
Grafting
Reactive Oligomers and Polymers
Copolymerization
Block Copolymers
Interpenetrating Polymer Network (IPN)
NEW TRENDS

I FUNDAMENTALS OF ADHESION

INTRODUCTION

Bond Types

Setting

Adhesive Joint Strengths

SURFACES AND THEIR CHARACTERIZATION

Solids

Liquids

INTERFACES

Thermodynamics of Adhesion

Acid-Base Considerations

SURFACE TREATMENT

Metal

Polymers

MEASUREMENT OF ADHESION

Introduction

Test Methods

STRENGTH OF ADHESION

Introduction

Molecular Interactions

Autohesion

Durability

Nondestructive Evaluation of Bonds

I ANIMAL GLUE

CHEMISTRY

MANUFACTURING

PROPERTIES

TEST GRADES

TESTING

CUSTOMER PREPARATION OF GLUE SOLUTIONS

LIQUID ANIMAL GLUES

FLEXIBLE AND NON-WARP GLUES
GLUE APPLICATION
COATED ABRASIVES
SET-UP WHEELS
GREASELESS BUFFING COMPOUNDS
GUMMED TAPE
GLASS CHIPPING
SIZING AND COATING
PAPER
COMPOUNDED RUBBER
GASKET MANUFACTURING
MATCHES
METAL REFINING
OTHER APPLICATIONS FOR ANIMAL GLUE

I CASEIN AND MIXED PROTEIN ADHESIVES

Manufacture of Casein
Specifications and Typical Analyses for Casein
CHEMISTRY AND PHYSICAL PROPERTIES OF GLOBULAR PROTEIN
CHEMICAL PROPERTIES OF CASEIN
PHYSICAL PROPERTIES OF CASEIN
Other Viscosity Factors
LIME-FREE CASEIN ADHESIVES
Preparation of Casein Solutions, General
Preservatives
Preparation of an Alkaline Casein Solution
Additives for Casein Solutions
APPLICATIONS USING CASEIN SOLUTIONS AND ADHESIVES
Casein as a Protective Colloid
Paper Coatings
Foil-to-Paper Laminating Adhesives
Ice Water Lable Paste Adhesives
CASEIN AND PROTEIN BLEND GLUES AS WOOD ADHESIVES
Chemistry of Protein Blend Glues
Formulation and Chemistry of Casein-Lime Glues
Mixing Casein Glue
Additives for Casein and Protein Blend Glues
Uses of Casein Glues
Specifications Applying to Casein Glue
Viscosity and Pot Life
Certification of Fire Doors
Properties of Casein Glues
Durability of Casein Glues

I STARCH BASED ADHESIVES

MODIFICATION OF STARCHES
Fluidity Starches
Oxidized Starches
Dextrinization
Hydroxyethylation
Cationic Starches
Amphoteric Starches
Miscellaneous Derivatives

EFFECT OF ADDITIVES

Sodium Hydroxide

Borax

Urea

Glycerol

Soluble Soaps

Urea-Formaldehyde Resin

Miscellaneous Additives

STARCH ADHESIVES

Jelly Gums

Other Liquid Formulations

Pastes

Borated Dextrins

White Dextrins

Canary Dextrins

British Gums

Waxy Starch Dextrins

Dextrin/Silicate Blends

Pregelatinized Starches

APPLICATION AREAS

Papermaking

Paper Coating

Corrugating

Bag Adhesives

Laminating Adhesives

Tube Winding

Corrugated Boxes

Gummed Tapes

Label and Envelope Adhesives

Paper Box

Textiles

Wall Covering Adhesives

Miscellaneous Uses

GOVERNMENTAL REGULATIONS: ADDITIVES

I NATURAL RUBBER ADHESIVES

INTRODUCTION

RAW MATERIALS

Natural Rubber Latex

Preservation

Dry Natural Rubber

Natural Rubber Grafted with Methyl Methacrylate (Heveaplus MG)

Depolymerized Rubber

Synthetic Polyisoprene

FORMULATION OF LATEX ADHESIVES

Quick-Grab Adhesive

Self-Adhesive Envelopes

Latex Pressure-Sensitive Adhesives

Tile Adhesives

Reseal Adhesives

Anchor Coat for Tufted Carpets

Other Nonvulcanizing Latex Adhesives

Vulcanizing Latex Adhesives

SOLUTION ADHESIVES FROM NATURAL RUBBER

Nonvulcanizing Adhesives

Vulcanizing Adhesives

Mastics, Asphaltics, and Sealants

GRAFTED COPOLYMER HEVEAPLUS MG

FORMULATIONS

I BUTYL RUBBER AND POLYISOBUTYLENE

INTRODUCTION

BASIC PROPERTIES

Butyl Rubber

Polyisobutylene

Halogenated Butyl Rubber

Butyl Rubber and Polyisobutylene Latices

Modified Butyls

FORMULATING AND PROCESSING

Choice of Polymer

Pigments and Fillers

Tackifiers, Plasticizers, and Other Polymeric Additives

Curing Systems

Solvents and Solution Processing

Mixing and Processing Techniques and Guidelines

APPLICATIONS AND FORMULATIONS

Adhesives and Mastics

Sealants

Mixing

I NITRILE RUBBER ADHESIVES

INTRODUCTION

PREPARATION OF NITRILE RUBBER

EMULSION TECHNOLOGY

Functionally Terminated Telechelic Liquid Polymers

COMPOUNDING NITRILE RUBBER CEMENTS

Polymer Selection and Solubilization

Types of Compounding Ingredients

APPLICATION

Nitrile Rubber Systems

Nitrile Rubber/Phenolic Adhesives

Nitrile Rubber/Epoxy Adhesives

I STYRENE-BUTADIENE RUBBER ADHESIVES

INTRODUCTION

Perspective

History of SBR

Manufacture of SBR

Basic Chemistry of SBR

SBR LATEXES IN ADHESIVES

General

Classification

Benefits of SBR Latexes

Compounding Ingredients

Major Applications

SBR (SOLID) IN ADHESIVES

General

Classification
Compounding Ingredients
Major Applications

I NEOPRENE (POLYCHLOROPRENE) -
BASED SOLVENT AND LATEX ADHESIVES
HISTORY
THE EFFECT OF POLYMER STRUCTURE
NEOPRENE SOLVENT-BASED ADHESIVE CEMENTS

Types of Neoprene
Antioxidants
Metal Oxides
Resins
Fillers
Curing Agents
Solvents
Adhesive Processing
End Uses
Application Methods
NEOPRENE LATEX-BASED ADHESIVES
Anionic Types
Nonionic Type
Compounding
Typical Formulations

I POLYSULFIDE SEALANTS AND ADHESIVES
POLYSULFIDE SEALANTS

Chemistry
Compounding
Curing Agents
Fillers
Plasticizers
Adhesion
Primers
Specifications
ADHESIVES FROM POLYSULFIDE LIQUID
POLYMER-EPOXY RESIN REACTIONS
Chemistry
Physical Properties
Applications
OTHER MERCAPTAN-TERMINATED POLYMERS
Polyethers
Polyesters
Urethanes
Olefin

I PHENOLIC RESIN ADHESIVES
CHEMISTRY
Formaldehyde
Novolaks
Strong Acid Reactions
Weak Acid Reactions
Resoles

Dispersion Resoles
Resin Cure
MANUFACTURE
ABRASIVES
Bonded Abrasives
Coated Abrasives
COATINGS
FOUNDRY
FRICTION COMPOSITES
MOLDING COMPOUNDS
PHOTORESISTS AND CARBONLESS PAPER
LAMINATING
WOOD BONDING
INSULATION AND FOAM
GENERAL ADHESIVES
ENVIRONMENTAL AND TOXICOLOGICAL CONSIDERATIONS
I AMINO RESIN ADHESIVES
HISTORY
RAW MATERIALS
CHEMISTRY
END USES
Particleboard
Plywood
High-Pressure Decorative Laminates
Miscellaneous Applications
TOXICITY

I EPOXY RESIN ADHESIVES

INTRODUCTION
EPOXY RESINS USED IN ADHESIVES
Bisphenol A Based Epoxy Resins
Epoxy Novolac Resins
High performance Epoxy Resins
Flexible Epoxy Resins
CURING AGENTS USED IN ADHESIVES
Polysulfide
Amines
Aliphatic Amines
Cycloaliphatic Amines
Aromatic Amines
Polyamides
Amidoamines
Dicyandiamide
Catalytic Curing Agents
Anhydrides
SUMMARY
DILUENTS
FILLERS
ELASTOMERIC MODIFIERS
TYPICAL ADHESIVE FORMULATIONS
COMPLEMENTARY TECHNOLOGIES
Robotics
Induction Curing

APPLICATIONS AND SUMMARY

I POLYURETHANE - AND ISOCYANATE - BASED ADHESIVES

REASONS FOR THE EFFECTIVENESS
OF POLYURETHANE AND ISOCYANATE-BASED
ADHESIVES 321-323

TYPES AND USE OF POLYURETHANE
AND ISOCYANATE BASED ADHESIVE SYSTEMS

Method A (isocyanate primer)

METHOD B (CONVENTIONAL PLASTIC OR
RUBBER VEHICLE + ISOCYANATE)

The Relative Effectiveness of "Vulcabond" T and Tx in
Rayon Cord-to-Natural Rubber Adhesion

Method C (in situ polyurethane polymerization)

Method D (polyurethane elastomer without or
with added polyisocyanate)

Method E (blocked di-or polyisocyanate)

Method F (aqueous dispersion)

Method G (film and tape)

Method H (powder)

POLYURETHANE STABILIZATION

HANDLING ISOCYANATE BASED ADHESIVES

IDENTIFICATION OF ADHESIVE COMPONENTS

I POLYOLEFIN AND ETHYLENE COPOLYMER-BASED HOT MELT ADHESIVES

ADHESIVE FORMULATION

Polymers

Tackifiers

Waxes

HOT MELT ADHESIVES APPLICATIONS

Cases, Cartons, and Trays

Bookbinding

Nonwovens

Furniture

Labels

Polyester Beverage Bottles

Carpet Seaming Tape

Paper Laminates

HOT MELT APPLICATION EQUIPMENT

FUTURE OF HOT MELT ADHESIVE

I POLYVINYL ACETAL ADHESIVES

CHEMISTRY

HEALTH, TOXICOLOGY, AND SAFETY

PHYSICAL PROPERTIES

Solubility

Compatibility

Viscosity

Mechanical Properties

Thermal Properties

USES AS AN ADHESIVES

Hot Melts
Thermosetting Adhesives
Adhesion to Metal
Adhesion to Natural Surfaces
Green Strength Binder
Composites
Adhesion to Glass
Other Uses

I ACRYLIC ADHESIVES TECHNOLOGY

Chemistry
Glass Transition Temperature (T_g)

Crosslinked Thermosets BONDING PROCESSES

Pressure Sensitive
Contact Bonding
Heat and Pressure Bonding
Vacuum Bonding

Wet Laminating Adhesives
Filled Adhesives

ENGINEERING ADHESIVES

Chemistry and Technology
Radiation Curing
Application Processes
Current Uses

I PRESSURE-SENSITIVE ADHESIVES FOR TAPES AND LABELS CONSTRUCTIONS

Manufacture
Backings
Release Coatings and Liners

ADHESIVE SYSTEMS

Tackifiers
Rubber-Based Adhesives
Acrylics
Silicones
Miscellaneous Polymers
Surface Energetics

Tack

Peel Adhesion
Cohesive Strength

TEST METHODS

Tack Testing
Peel Adhesion Testing
Shear Resistance Testing
Miscellaneous Tests

Tapes
Labels and Decals
Other Products
Adhesive Mass Thicknesses

I FACTORS INFLUENCING GUM COSTS AND APPLICATIONS

DEFINITION OF GUM

FACTORS AFFECTING RAW GUM COSTS

1. Exudate Gums
2. Seaweed Gums
3. Seed Gums
4. Starch and Cellulose Derivatives

INDUSTRIALLY VALUABLE PROPERTIES OF GUMS

1. Linear Neutral Polysaccharides
2. Branched Neutral Polysaccharides
3. Polysaccharides with Carboxyl Groups
4. Polysaccharides with Strong Acid Groups
5. Polysaccharides with basic Groups

MODIFIED GUMS

1. Introduction of Neutral Groups
2. Introduction of Acidic Groups
3. Introduction of Groups
4. Graft Polymers
5. Other Chemical Modifications of Natural Polysaccharides

I AGAR

INTRODUCTION

SOURCE

1. Raw Material
2. Processing
3. Finished Product

HISTORY

1. Discovery
2. Manufacture
3. Use
4. Present Applications
5. Derivatives

IV. STRUCTURE

PROPERTIES

1. Solid
2. Sols
3. Gels

I ALGIN

INTRODUCTION

PRODUCTION

1. Source
2. Seasonal Variations
3. Harvesting
4. Processing
5. Grades
6. Industrial Importance
7. Potential Amount

APPLICATIONS

1. Introduction
2. Mode of Action
3. Foods

DAIRY PRODUCTS

BAKERY PRODUCTS

OTHER FOOD PRODUCTS

4. Pharmaceuticals and Cosmetics

5. Industrial Applications

PAPER PRODUCTS

TEXTILE PRODUCTS

RUBBER PRODUCTS

OTHER INDUSTRIAL USES

STRUCTURE

PROPERTIES

1. Dissolution

2. Solution Properties

3. Gels

4. Films

5. Compatibilities

6. Algin in Foods

7. Other Properties

I LAMINARAN

INTRODUCTION

PRODUCTION

1. Source

2. Producing Areas

3. Seasonal Effects

4. Collection

5. Preparation

HISTORY OF DEVELOPMENT

STRUCTURE

PROPERTIES

I CHITIN AND ITS DERIVATIVES

INTRODUCTION

PRODUCTION

1. Crustaceans

2. Insects

3. Fungi

4. Preparation

5. Preparation of Deacetylated Chitin, Other Chitin Derivatives, and D-Glucosamine

6. Grades

7. Potential Amount

HISTORY

IV APPLICATION

1. Sizing

2. Adhesives

3. Emulsion Stabilization and Thickening

4. Pharmaceuticals and Cosmetics

5. Extruded Fibers and Films

6. Glycosamine Hydrochloride in Foods and Pharmaceuticals

STRUCTURE

PROPERTIES

1. Solubility and Viscosity

2. Gels

3. Films and Fibers

4. Adhesiveness
5. Compatibilities

I GUM ARABIC

INTRODUCTION

PRODUCTION

1. Republic of the Sudan
3. Nigeria
4. Tanganyika
5. Morocco
6. British Somaliland and Abyssinia
7. South Africa
8. India
9. Australia
10. Miscellaneous

TYPES OF GUM IN THE UNITED STATES

STRUCTURE

ARABIC ACID

1. Preparation
2. Properties
3. Degraded Gum Arabic
4. Derivatives of Arabic Acid

FACTORS WITH AFFECT VISCOSITY

1. Concentration
2. Temperature
3. Electrolytes
4. pH
5. Solvents Others Than Water
6. Aging
7. Mechanical Treatment
8. Ultrasonic Vibrations and Ultraviolet Irradiation

OTHER PHYSICAL PROPERTIES

1. Surface Tension
2. Freezing Point

COACERVATION

1. Introduction
2. Gum Arabic-Gelatin Coacervates
3. Preparation of Coacervates
4. General Properties, Physical Appearance, and Composition
5. Effect of Temperature
6. Effect of pH
7. Reactions of Salts
8. Physical Phenomena
9. Uses of Gum Arabic-Gelatin Coacervates
10. Coexisting Coacervates
11. Other Coacervates

CHEMICAL PROPERTIES

1. Chemical Reactivity
2. Solubility
3. Enzymes

SEPARATION AND IDENTIFICATION OF GUM ARABIC

1. Isolation of Gum Arabic from Commercial Products
2. Systematic Analytical Scheme

3. Physical Confirmatory Tests
4. Chemical Confirmatory Tests
5. Direct Tests for Gum Arabic in Some Commercial Products

USES

1. Foods
2. Adhesives
3. Paints
4. Inks
5. Lithography
6. Textiles
7. Miscellaneous

I CORN HULL GUM

INTRODUCTION

SOURCE AND PREPARATION

DEVELOPMENT OF USE

STRUCTURE

PROPERTIES

I GUAR GUM

INTRODUCTION

PRODUCTION

1. Source and Producing Areas
2. Agronomics
3. Purification
4. Grades

USES

1. HISTORY
2. Mining Industry
3. Foods
4. Cosmetics and Pharmaceuticals
5. Paper Industry
6. Explosives
7. Derivatives

STRUCTURE

PROPERTIES

1. Viscosity
2. Gels
3. Films
4. Adhesiveness
5. Miscellaneous

I GUM KARAYA

INTRODUCTION

Production

1. Source
2. Producing Areas
3. Seasonal Effect
4. Collection
5. Purification
6. Grades
7. Impurities
8. Potential Amount

USES

1. History
2. Commercial Value

STRUCTURE

PROPERTIES

1. Dissolution and Viscosity Measurements
2. Gels
3. Films
4. Adhesiveness
5. Acid Resistance
6. Dispersibility
7. Ropiness
8. Water Retention

I PECTIN

INTRODUCTION

PRODUCTION

1. Source
2. Producing Areas
3. Seasonal Effects
4. Collection
5. Purification
6. Grades and Definitions of Grades
7. Impurities
8. Quantities Marketed
9. General Industrial Uses Other Than in Foods

FOOD

Mode of Action

Structure

Properties

1. Pectin Types as Defined by Degree of Methylation
2. Solubility
3. Solutions, Stability and Viscosity
4. Gels
5. Assay Methods, Calculations, and Composition

DIRECTORY SECTION

PRESENT MANUFACTURERS

SUPPLIERS OF RAW MATERIALS

SUPPLIERS OF THE PLANT M/C & EQUIPT.

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.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable

Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes various 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.

NIIR PROJECT CONSULTANCY SERVICES , 106-E, Kamla Nagar, New Delhi-110007, India. **Email:** npcs.india@gmail.com **Website:** NIIR.org

Sat, 18 Nov 2017 21:05:28 +0530