106-E, Kamla Nagar, New Delhi-110007, India.
Tel: 91-11-23843955, 23845654, 23845886, +918800733955
Mobile: +91-9811043595

Email: npcs.ei@gmail.com, info@entrepreneurindia.co
Website: www.entrepreneurIndia.co

Synthetic Resins Technology Handbook

Code: NI150	Format: paperback
Indian Price: ₹1100	US Price: \$125
Pages: 588	ISBN: 8178330261
Publisher: Asia Pacific Business Press Inc.	

Description

Synthetic resin is typically manufactured using a chemical polymerization process. This process then results in the creation of polymers that are more stable and homogeneous than naturally occurring resin. Since they are more stable and are cheaper, various forms of synthetic resin are used in a variety of products such as plastics, paints, varnishes, and textiles. There are various kinds of synthetic resins; acetal resins, amino resins, phenolic resins, epoxy resins, fufuryl alcohol: resins, fluorocarbon resins, polyurethane resins, etc. Resins are polymeric compound which are available in nature and are also manufactured by synthetic routes. Some resins are also manufactured by partial modification of natural precursor polymer by chemical. The classic variety is epoxy resin, manufactured through polymerization, used as a thermoset polymer for adhesives and composites. Epoxy resin is two times stronger than concrete, seamless and waterproof. Various thermoplastic thermosetting polymers, including elastomers, have been incorporated to modify the properties for the cured epoxy resin products. Elastomers provide greater elongation and impact strength. Polysulfides, the most commonly used elastomer to flexibilise epoxy resins. Heat resistant polymers are employed for the various uses; heat flame resistant fibers plus ultra high strength, high modulus fibers; films, laminating varnishes and wire enamels; structural adhesives and molding powders. The Synthetic Resin Manufacturing industry initially enjoyed strong growth over its earlier history as plastics began to increasingly replace traditional materials such as wood, leather and metal. Plastic is estimated to have been the most used material globally.

The book basically deals with new raw materials for cost reduction of alkyds and unsaturated polyester, amino resins, polyester based resins, enzymatic synthesis of phenolic copolymers, radiation curable hybrid formulation, self polishing anti fouling,

epoxy resins, epoxy resins from methyl epichlorohydrin, fillers, reinforcements, and other additives, cardanol modified epoxy resins, baking coatings from epoxy derived from cardanol, phenolic resins, polyurethane resins, aqueous polyurethane dispersion technology, heat resistant resins, etc.

The resin have wide industrial uses like in lacquers, paints, textiles, varnishes, printing inks and cosmetic etc. this book contains formulae, processes and applications of various resins. This book will be very resourceful to new entrepreneurs, consultants, technical institutions, libraries and for those who wants to venture into this field.

Content

1. ACROLEIN RESINS

Acrolein Monomer

Physical Properties

Chemical Properties

Preparation

Polymerization

Free Radical Homopolymerization

In Bulk and in Organic Media

In Aqueous Medium

Radical and Graft Copolymerization

Properties of the Polymer Resin

Physical Properties

Structure

Uses

Uses of the Polymers

2. ACRYLAMIDE RESINS

Physical Properties of the Monomers
Chemical Properties of the Monomers
Manufacture of Monomers
Polymerization
Free Radical Polymerization in Solution
Polyamide Formation
Copolymerization
Chemical Reactions of Polymers

3. 2 CYANOACRYLIC ESTER RESINS

Preparation of Monomeric Esters

Properties of Monomeric Esters
Polymerization of Monomeric Esters
Free Radical Initiation
Anionic Initiation
Properties of Polymeric Esters

4. 2 HALO ACRYLIC ESTER RESINS

Physical Properties of Monomers Chemical Properties of Monomers Polymerization Properties of Polymers

Processing

Uses

Test Methods

5. ACRYLIC EPOXY URETHANE RESINS

Introduction

Experimental

Raw Material

Synthesis of Acrylic Resin

Preparation of Epoxy Solution

Preparation of Acrylic Epoxy Blends

Preparation of Paints

Preparation of Test panels

Testing of Coatings

Results and Discussions

Conclusions

6. LIGHT STABILIZER ACRYLIC RESINS

Introduction

Experimental

Acrylic Polyol Resin Synthesis

Polymer Bound Light Stabilizer Acrylic Resin Synthesis

Coatings Compositions Containing Light Stabilized Acrylic Resins

Characterization

Results and Discussion

Acrylic Polyol Properties and Formulations

Film Properties

Accelerated Weathering of Acrylic Bound HALS Coatings

Accelerated Weathering of Acrylic Bound UVA Coatings

Summary

7. ACETAL RESINS

Preparation of polymers

Old Polymers of Formaldehyde

New Polymers of Formaldehyde

Polymerization of Trioxane

Polymerization Initiated by Irradiation

Higher Aldehydes

Other Aldehydes

Properties of Aldehyde Polymers

Polymers of Formaldehyde

Physical Properties

Chemical Properties

Polymers of Other Aldehydes

Processing of Formaldehyde Polymers

Molding

Other Methods of Processing

Uses of Polymers of Formaldehyde

Grades and Prices

8. ALKLENIMINE RESINS

Chemical Reactions of the Monomer

Polymerization of Alkylenimines

Properties of Polyalkylenimines

Uses of Polyalkylenimines

Use in Paper

Uses with Textiles

Natural Fibres

Synthetic Fibres

Uses with Plastics

Use as a Flocculating Agent

Uses in Ion Exchange and Complexing

Miscellaneous Uses

9. ALLENE RESINS

Properties of the Monomer

Preparation

Polymerization

Properties of Polyallenes

Copolymerization

10. ALLYL RESINS

Allyl Polymerization

Properties of Some Allyl Monomers

11. ALLYL S TRIAZINE RESINS

Allyl Cyanurates and Allyl Isocyanurates

Synthesis and Properties of Monomers

Polymerization

Homopolymerization

Copolymerization

Thermal Analysis of Homopolymers

Processing of Polymers

Properties of Polymers

Allylmelamines

Hexaallylmelamine

N,N Diallylmelamine

Allylmelamine Ethers

12. ALLYL ETHER RESINS

Physical Properties of Allyl Ether Monomers

Preparation of Allyl Ether Monomers

Allyl Ether Homopolymers

Polymerization

Physical and Chemical Properties

Uses

Allyl Ether Copolymers

Uses

Unsaturated Polyesters and Alkyds

Unmodified Allyl Ether Polyesters

Uses

Non oil Modified Polyester Resins

Uses

Oil Modified Polyesters

Polyurethane Elastomers

Reactions with Sulfur Compounds

13. ALLYL ESTER RESINS

Allyl Ester Monomers

Polymerization

Properties of Polymers

Processing

Molding Compounds

Reinforced Plastics

Decorative Laminates

Polymer Uses

Molded Parts

Reinforced Plastic Laminates

Decorative Laminates

Varnishes and Sealants

Monomer Uses

Diethylene Glycol Bis(Allyl Carbonate) Polymers

Properties of the Monomer

Manufacture of the Monomer

Polymerization Methods

Properties and Uses of Polymers

14. ALKYD RESINS

Introduction

Classification

Drying

Nondrying

Synthesis

Fatty Acid Method

Alcoholysis or Monoglycerides Method

Acidolysis Process

Etherification

Addition Reaction of Unsaturated Monobasic Fatty Acids

Addition Reactions with Other Unsaturated Alkyd Ingredients

Reactions During Coating Formation with Drying Alkyds

Reactions During Coating Formation in Alkyd Blends

Raw Materials

Polyhydric Alcohols

Polybasic Acids

Fatty Acids and Oils

Driers

Modifiers

Blending Agents

Fatty Acid Method

Fatty Acid Oil Method

Oil Dilution Method

Alcoholysis Method

Fusion versus Solvent Processing

Processing and Equipment Considerations Quality Control and Specifications

Use of Alkyds in Industrial Finishes

Alkyd Cellulose Nitrate Blends for Lacquers

Improved Adhesion

Gloss

Depth of Finish

Build

High Solids Lacquers

Shrinkage

Solvent Release

Heat Sealing

Cost

Industrial Alkyd Amino Resin Metal Finishes

Appliance Finishes

Alkyd Amino Resin Automotive Finishes

Use of Alkyds in Trade Sales Finishes

Interior Architectural Finishes

Alkyd Flat Wall Paints

Wall Primers and Sealers

Interior Semigloss Enamels

Interior Gloss Enamels

Exterior Architectural Finishes

Enamel Primers or Undercoaters

Exterior Air Drying Topcoat Enamels

Miscellaneous Trade Sales Finishes

Chemically Resistant Paints

Noncoating Uses

Oil Free Alkyds of Hydroxylated Polyester

Nonpolluting Resins

15. ACRYLIC MODIFIED ALKYD RESINS

Traffic Paints

Procedure

Procedure

Procedure

Industrial Applications

Conclusion

16. NEW RAW MATERIALS FOR COST REDUCTION OF ALLKYDS AND UNSATURATED POLYESTER

TPTHL A New Raw Material for Alkyds

Properties of TPTHL

Advantages of TPTHL

Disadvantages TPTHL

Polymer S: A New Raw Material for Unsaturated Polyester

Specification of Polymer S

Advantages of Polymer S

Disadvantages of Polymer S

Synthesis of Unsaturated Polyester by Using Polymer S Reaction Charge

Conclusion

17. AMINO RESINS

Raw Materials

Urea

Melamine

Formaldehyde

Other Materials

Chemistry of Resin Formation

Manufacture

Typical Resin Formulation and Techniques

Parts List

Urea Formaldehyde Resins

Dimethylolurea

High Solids Urea Formaldehyde Adhesive Resin

Laboratory Procedure

Alkylation or Etherification

Butylated Urea Resin

Solubility and Compatibility

Mineral Spirits Tolerance

Protective Coating Resin with High Mineral Spirits Tolerance

Laboratory Procedure

Methylated Urea Formaldehyde Textile Resins

Laboratory Procedure

Urea Formaldehyde Particle Board Adhesive

Laboratory Procedure

Anionic Urea Resin

Cationic Resins

Cationic Urea Resin

Gap Filling Adhesives

Gap Filling Urea Adhesive

Melamine Formaldehyde Resins

Dimethylolurea

Butylated Melamine Resins

Butylated Melamine Protective Coating Resin

Laboratory Procedure

Protective Coating Resin with High Mineral Spirits Tolerance

Laboratory Procedure

Chlorine Resistant Melamine Resin

Laboratory Procedure

Trimethoxymethyl Melamine

Laboratory Procedure

Hexamethoxymethyl Melamine

Laboratory Procedure

Melamine Resin Molding Powder

Melamine Resin Acid Colloid

Control of the Extent of the Reaction

Free Formaldehyde Estimation

Viscosity Tests

Solubility Tests

Cure Tests

Urea versus Melamine Resins

Package Stability

Competitive Product Analysis

Uses

Chemical Modification for Water Soluble Products

Chemical Modification for Oil Soluble Products

Ethylene Urea

Propylene Urea

Triazone

Methylated Uron Textile Resins

Laboratory Procedure

Uron Resins

Glyoxal Resins

Miscellaneous Resins

Amino Resins in the Paper Industry

Formulations for Regular and HE Colloids

Other Uses

Toxicity

18. POLYESTER BASED RESINS

Introduction

Experimental

Solvent Borne Coil Coating Resin

Water Borne Coil Coating Resin

Coating BAL 389

New Glycol Formulations

Conclusion

19. ENZYMATIC SYNTHESIS OF PHENOLIC COPOLYMERS

Introduction

Mechanism of Phenolic Polymerisation

Materials and Methods

Material Sources

Experimental

- A) P Phenyl Phenol Cardphenol Copolymer Synthesis
- B) P Phenyl Phenol Aniline Copolymer Synthesis

Results and Discussion

IR Interpretation

- A) P Phenylphenol Cardphenol Copolymer
- B) P Phenylphenol Aniline Copolymer

20. PROTECTION AGAINST ULTRAVIOLET LIGHT WITH UVALINK ADP

Introduction

Ultraviolet Light as a Component of the Solar Spectrum

Influence of Geographical and Meteorological Conditions

Interaction of Light and Matter

Effects of Solar UV radiation

UV Stabilizers

Chemical Classes of UV Stabilizers

Markets and Producers

UVAL INK ADP

How UVALINK ADP Works

Conventional UV Stabilizers Behave Totally Differently

21. RADIATION CURABLE HYBRID FORMULATION

Introduction

Results and Discussion

Diluents

Chemistry

Photoinitiator System

Viscosity

Cure Speed

Humidity

Cured Film Properties

Diluent Comparison

Properties vs Cure Speed

22. MICROGEL EMULSIONS

Introduction

Microgels are Prepared

Microgels by Radical Initiated Polymerisation in Emulsion

Experimental

Apparatus

Preparation of Monomer/Pre Emulsion

Reaction Flask Charge

Procedure

Preparation of Emulsions

Characterization and Analysis

Paint Study

Paint Preparation

Characterization of Paint

Results and Discussions

Conclusions

23. SELF POLISHING ANTIFOULINGS

Marine Fouling

Types of Foulings

Fouling on Ship Hulls

Underwater Hull Roughness

Measurement of Average Hull Roughness

Limitation of Hull Roughness Measurement

Antifoulings

Soluble Matrix Paints

Insoluble Matrix Paints

Self Polishing Paints

Organotin Polymers

History and Development

Basic Characteristic Required

Organotin Monomers

Synthesis

Synthesis of Organotin Monomer

Testing of Prepared Organotin Monomer

Polymerization

Copolymerization

Tributyltin Acrylate/Second Monomer

Tributyltin Methacrylate/Second Monomer

Influence of Solvents on Copolymerization

Modifications of Functional Polymers Route B.

Determination of Polymer Composition

Characteristics of Organotin Polymers

Influence of the Presence of Diorganotin Impurities During Synthesis

Self Polishing A/F. Paint Composition and Role of Ingredients

Organotin Polymer

Sea Water Soluble Pigments

Retarders

Reinforcing Bioactive Materials

Other Ingredients

Viscosity Control of Self Polishing Paints

Dissolution/Erosion Mechanisms

Binder Phase

Pigment Phase

Reactions Which Affect the Pigment Phase

Reactions Which Affect the Binder Phase

Equilibrium Between Pigment Phase and the Binder Phase

Uniform Distribution of Toxins in the Paint Film

Influence of Various Parameters on the Polishing Rate

Internal

External

Testing of Self Polishing Antifoulings

Dynamic Testing

Leaching Rate Measurement

Various Types of Self Polishing Paint

Environmental Consideration

Scope and Future Trends

24. EPOXY RESINS

Introduction

Synthesis of Resin Intermediates

Resins from Epichlorohydrin and Bisphenol A

Synthesis of Resin having Average Molecular Weight of about 370 and 1,2 Epoxy

Equivalency of 1.85

Synthesis of Medium and High Molecular Weight Epoxy Resins

Cycloaliphatic Epoxies

Epoxidized Polyolefins

Epoxidised Oils and Fatty Acid Esters

Aliphatic Cycloaliphatic Glycidyl Type Resins

Glycidyl Ethers

Glycidyl Esters

Epoxy Novolac Resins

Resins from Phenols other than Bisphenol A

Resins from Aliphatic Polyols

Resins from Long Chain Acids

Fluorinated Epoxy Resins

Epoxy Resins from Methylepichlorohydrin

Miscellaneous Epoxy Resins

Epoxy Esters

Water Borne Epoxy Resins and Derivatives

Diluents and Modifiers

Diluents

Flexibilisers

Bituminous Modifiers

Synthetic Polymers as Modifiers

Fillers, Reinforcements, and Other Additives

Epoxide Reactions and Curing Mechanisms

Catalytic Curing Agents

Reactive Curing Agents

Curing of Epoxy Esters

25. CARDANOL MODIFIED EPOXY RESINS

Introduction

Experiments

Evaluation of Resins Prepared

Reactions

Preparation of Card Bisphenol

Homopolymerisation of Cardanol

Self Condensation of Phenol

Chemical Reaction Investigation

Process Modification

Qualitative Determination of Purity of Desired Product

Investigation using Boron Trifluoride as Cationic Condensing Agent Removal of Excess of Phenol Baking Coatings from Epoxy Derived from Cardanol Air Drying Coatings from Acrylated Card Bisphenol Epoxies Conclusion

26. FUFURYL ALCOHOL: RESINS

Chemistry

Principal Uses

Foundry Resins

Mortars, Grouts and Cements

Laminating Resins

Furan Polymer Concrete

Impregnating Solution and Carbon Binder

Epoxy Resins

Phenolic and Urea Resin Modification

Oil Well Sand Consolidation

Corrosion Resistant Fibre Reinforced Plastic (FRP)

Low Fire Hazard Foams

Impregnants

Developmental Impregnants

Furfural Acetone Resin Impregnant

Resin Pitch Impregnants

Alkaline Curing Resin Pitch Impregnant

Acid Curing Resin Pitch Impregnant

Solvent Applications

Chemical Synthesis

Health and Safety

Furan & Tetrahydrofurfuryl Alcohol : Resins Furan

Chemical Properties

Peroxide Formation

Uses

Toxicology

Tetrahydrofurfruyl Alcohol (THFA)

Chemical Properties

Manufacture

Applications in Stripping Formulations

Paint, Varnish, Caulk etc.

Consumer Cleaning Products

Improved Products for Industrial and Commercial Cleaning Applications

Use in Approved Biocide and Pesticide Formulations
For Insect Repellents, Insecticides, and Herbicides
Applications in Polymers, Resins and Elastomers
Cleaning, Dyeing, and Finishing
Applications as a Plasticizer and Finishing Agent
Other Uses
2,5 Bis (Hydroxymethyl) Furan
Manufacture
Applications

27. FLUOROCARBON RESINS

Tetrafluoroethylene Polymers

Polytetrafluoroethylene

Properties

Methods of Manufacture

Commercial Grades and Specifications

Analysis of Polytetrafluoroethylene

Characterization by Infrared Spectroscopy

Specification Tests

Procedure

Melting Point

Procedure

Specific Gravity

Procedure

Apparent Density

Procedure

Particle size

Procedure

Procedure

Specific Surface Area

Water Content

Procedure

Procedure

Thermal Instability

Color

Tetrafluoroethylene Hexafluoropropylene Copolymer

Properties

Methods of Manufacture

Commercial Grades and Specifications

Analysis of Tetrafluoroethylene Hexalfuoroproylene Copolymer

Other Fluorine Containing Polymers

Polychlorotrifluoroethylene

Chlorotrifluoroethylene Vinylidene Fluoride Copolymer

Poly(vinyl Fluoride)

Poly(vinylidene Fluoride)

Vinylidene Fluoride Hexafluoropropylene Copolymer

Method of Analysis

Zero Strength Time

Procedure

Volatiles

Procedure

Mooney Viscosity

Procedure

Physical Test for Cured Elastomers

Procedure

28. PHENOLIC RESINS

The Chemistry of Phenolic Resins

Factors Influencing Resin Formation

The Nature of the Catalyst

Base Catalysed Phenolic Resins

Acid Catalysed Phenolic Resins

Concentration of the Catalyst

The Phenol Aldehyde Ratio

The Chemical Nature of the Phenol and the Aldehyde

The Temperature and Reaction Time

Modifying Agents, Fillers, and Extenders

The Structure of Phenolic Resins

Formation of Phenol Alcohols

Formation of Methylene Bridges

Formation of Dibenzyl Ethers

Formation of Quinone Methides

Raw Materials

Phenols

Cashew Nut Shell Liquid (CNSL)

Aldehydes

Paraformaldehyde

Trioxane and Cyclic Formals

Hexamethylenetetramine (HMTA)

Furfural

Other Aldehydes

Fillers for Phenolic Moulding Powders

Primary Requirements

Secondary Requirements

Types of Filler

Organic Filler

Lignin and Lignin Extended Fillers Proteinaceous Fillers

Carbon Fillers

Mineral Fillers

Thermal Degradation

Modified and Thermal Resistance Resins

Etherification Reactions

Esterification Reactions

Heavy Metal Modified Resins

Chemical Resistance

Resistance to Microorganism

Oil Soluble Phenolic Resins

Composite Wood Material

Moulding Compounds

Applications

Heat and Sound Insulation Materials

Industrial Laminates and Paper Impregnation

Coatings

Foundry Resins

Precoated Resin Shell Sand

Precoated Resin Shelll Sand: Warm Coating Process

Precoated Resin Shell Sand: Hot Coating Process

Phenolic Resin as Ion Exchange Resin

Abrasive Materials

Formulation for the Manufacturing of Roughing Wheels

Friction Materials

Phenolic Resin in Rubbers and Adhesives

29. POLYURETHANE RESINS

Polyurethanes Resins

Chemistry

Raw Materials

Isocyanates

Tolylene Diisocyanate (TDI)

4,4 Diphenylmethane Diisocyanate (MDI)

Hexamethylene Diisocyanate (HDI)

Other Diisocyanates used in Coating Systems

Hydroxy Component

Hazards of Isocyanates

Classification of Polyurethanes

Urethane Oils and Urethane Alkyds

Moisture Cured Urethanes

Storage Stability

Cross Linking Density

Drying Time

Catalysts

Solvents

Pigmentation

Additives

Film Properties and Uses

Typical Formulations

Manufacture

Blocked Isocyanate Systems

Two Component Catalyst Cured Polyurethanes

Two Component Polyol Type Polyurethanes

Formulation

Formulation

30. AQUEOUS POLYURETHANE DISPERSION TECHNOLOGY

Introduction

Concept of Aqueous PUD

Chemical Classification

Preparation Procedures

Chemical Crosslinking

Factors Influencing Performance

Recent Advantages

Combination of PUD with Acrylics

Characterisation of Aqueous PUDs

Applications

The future

31. HEAT RESISTANT RESINS

Thermal Stability

Synthesis and Properties

Simple Condensation Polymers

Heterocyclic Polymers

Health and Safety Factors
Applications
Fibres
Films
Varnishes
Adhesives
Molding Powders

About NIIR Project Consultancy Services (NPCS)

NIIR Project Consultancy Services (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services. Its various services are: Prefeasibility study, New Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Preparation of Project Profiles and Pre-Investment and Pre-Feasibility Studies, Market Surveys and Studies, Preparation of Techno-Economic Feasibility Reports, Identification and Selection of Plant and Machinery, Manufacturing Process and/or Equipment required, General Guidance, Technical and Commercial Counseling for setting up new industrial projects and industry. NPCS also publishes various technology books, directories, databases, detailed project reports, market survey reports on various industries and profit making business. Besides being used by manufacturers, industrialists, and entrepreneurs, our publications are also used by Indian and overseas professionals including project engineers, information services bureaus, consultants and consultancy firms as one of the inputs in their research.

NIIR PROJECT CONSULTANCY SERVICES 106-E, Kamla Nagar, New Delhi-110007, India. Tel: 91-11-23843955, 23845654, 23845886, +918800733955 Mobile: +91-9811043595

Email: npcs.ei@gmail.com, info@entrepreneurindia.co Website: www.entrepreneurIndia.co