AN ISO 9001 : 2015 CERTIFIED COMPANY

Synthetic Resins Technology Handbook

FREE SAMPLE: contents and introduction of the 588-page book
Price: Rs 1,100 | US$ 29.73

Order the full book >

AN ISO 9001 : 2015 CERTIFIED COMPANY

Author: NIIR Board of Consultants & Engineers
Format: paperback
Code: NI150
Pages: 588
Price: Rs 1,100 | US$ 29.73
Publisher: NIIR PROJECT CONSULTANCY SERVICES
Shipping: 5 days

About the Book

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.

Contents

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 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
Uses

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

Get the full book
This sample shows only the contents and introduction. The full book has every chapter.
Price: Rs 1,100 | US$ 29.73
Delivery: Shipped within 5 working days of payment
Order online: niir.org/books/synthetic-resins-technology-handbook/ **WhatsApp:** +91 9097-075-054

Planning a unit? NPCS project reports:

- Formaldehyde project report

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, Market Research, Manufacturing Process, Machinery, Raw Materials, Project Feasibility, Investment Opportunities, Technical Consultancy and Startup Help.

NPCS also publishes process technology books, technical books, startup books, directory, business database, detailed project reports and market research reports.

Our Detailed Project Report aims at providing all the critical data required by entrepreneurs for starting new business ventures.

NIIR PROJECT CONSULTANCY SERVICES
106-E, Kamla Nagar, New Delhi-110007, India

Email: npcs.india@gmail.com **Website:** https://www.niir.org/

Scan to order the full book on niir.org