Phenolic resins, also known as phenol–formaldehyde resins, are synthetic polymers that are produced from the reaction of phenol or substituted phenol with formaldehyde at high temperatures. These are widely used in wood adhesives, molding compounds, and laminates. The resins are flame-retardant, demonstrate high heat resistance, high tensile strength, and low toxicity, and generate low smoke. In the report, the phenolic resins market is segmented on the basis of product type, application, and region.

Phenolic Resin Market size estimated to reach at USD 19.13 billion in 2026. Alongside, the market is anticipated to grow at a CAGR of 5.4% during the forecast period. The global phenolic resins market has experienced a notable growth and it has been projected that the global market will see stable growth during the forecast period. The high mechanical strengths, low toxicity, heat resistance, low smoke and other several properties has made the phenolic resins to make their use in the applications such as in laminations, wood adhesives, molding compound, construction, automobile and others. Growing demand of these applications has increased the production of phenolic resins to meet the current market demand. Also, phenolic resins is used in flame retardant which is very crucial for automobiles and aircrafts.

This book basically deals with general reaction of phenols with aldehydes, the resoles, curing stages of resoles, kinetics of a stage reaction, chemistry of curing reactions, kinetics of the curing reaction, the novolacs, decomposition products of resites, acid cured resites, composition of technical resites, mechanisms of rubber vulcanization with phenolic resins, thermosetting alloy adhesives, vinyl phenolic structural adhesives, nitrile phenolic structural adhesives, phenolic resins in contact adhesives, chloroprene phenolic contact adhesives, nitrile phenolic contact adhesives, phenolic resins in pressure sensitive adhesives, rubber reinforcing resins, resorcinol formaldehyde latex systems, phenolic resin chemistry, bio-based phenolic resins, flexibilization of phenolic resins, floral foam (Phenolic Foam) with resin manufacturing, lignin-based phenol formaldehyde (LPF) resins, phenol formaldehyde resin, alkaline phenol formaldehyde resin, furfuryl alcohol phenol urea formaldehyde resin, phenol formaldehyde resin (Shell Sand Resin), phenol formaldehyde resin (Cold Box Resin), effluent treatment plant, standards and legislation, marketing of thermoset resins, process flow sheet, sample plant layout and photographs of machinery with supplier’s contact details.

A total guide of phenolic resins and entrepreneurial success in one of today’s most lucrative resin industry. This book is one-stop guide to one of the fastest growing sectors, where opportunities abound for manufacturers, retailers, and entrepreneurs. This is the only complete handbook on Phenolic resins.
1. HISTORICAL DEVELOPMENT OF PHENOLIC RESINS

2. RAW MATERIALS
   Phenols, Physical Properties of Phenol, Cumene Process (Hock Process), Cresols and Xylenols â€“
   Synthesis Methods, Alkylphenols, Phenols from Coal and Petroleum, Other Phenolic Compounds,
   Resorcinol, Bisphenol-A, Formaldehyde, Properties and Processing, Paraformaldehyde, Trioxane and Cyclic
   Formals, Hexamethylenetetramine, HMTA, Furfural, Other Aldehydes

3. CHEMICAL STRUCTURE
   General Reaction of Phenols with Aldehydes, The Resoles, Curing Stages of Resoles, Kinetics of A-Stage
   Reaction, Chemistry of Curing Reactions, Kinetics of the Curing Reaction, The Novolacs, Decomposition
   Products of Resites, Acid-Cured Resites, Composition of Technical Resites

4. PHENOLIC RESINS FROM HIGHER ALDEHYDES
   Acetaldehyde, Butyraldehyde, Chloral, Furfural, Acrolein

5. PHENOLIC RESINS FROM POLYHYDRIC PHENOLS

6. REACTION MECHANISMS
   Molecular Structure and Reactivity of Phenols, Formaldehyde-Water and
   Formaldehyde-Alcohol Equilibria, Phenol-Formaldehyde Reaction under Alkaline Conditions, Inorganic
   Catalysts and Tertiary Amines, Ammonia, HMTA and Amine-Catalyzed Reactions, Reaction Kinetics of the
   Base-Catalyzed Hydroxymethylation, Prepolymer Formation, Resole Cross-Linking Reactions. Quinone
   Methides, Acid Curing, Heat Curing, Phenol-Formaldehyde Reactions under Acidic Conditions, Reaction
   Kinetics in Acidic Medium, Reaction under Weak Acidic Conditions. â€œHigh-Orthoâ€-Novolak Resins,
   Novolak Cross-Linking Reaction with HMTA, Reaction with Epoxide Resins, Reactions with Diisocyanates

7. THE PHYSICAL STRUCTURE OF PHENOLIC RESINS
   Introduction, X-Ray Examination, Electron Microscope Examination, The Isogel Theory of Phenoplast
   Structure, The Spherocolloid Theory of Phenoplast Structure, Further Swelling Experiments, Development of
   Structure in A-Stage Resin, General Picture of Phenoplast Structure, Structure of Cast Phenoplasts

8. RESIN PRODUCTION

9. FILLERS FOR PHENOLIC RESIN MOULDING POWDERS
   Types of Filler, Effect of Filler on Impact Strength and Damping, Microscopic Structure of Fillers, Ratio of
   Resin to Filler, Standard Classification of Phenoplast Molding Powder According to Filler, Properties of
   Individual Fillers, Cellulose Derivatives, Wood Flour, Walnut-Shell Flour, Cottonseed Hulls, Cellulosic Fibers,
   Textile By-Products, Proteinaceous Fillers, Carbon Fillers, Mineral Fillers

10. FILLERS AND RESINS FOR LAMINATES
Classification of Laminates, Laminated Phenolic Sheets, Laminated Phenolic Tubes (NEMA Classification), High Strength Paper Laminates, Plastic Bonded Cotton Fiber, Glass Fabric Filler, Resins used for Laminates

11 PHYSIOLOGY AND ENVIRONMENTAL PROTECTION

12. DEGRADATION OF PHENOLIC RESINS BY HEAT, OXYGEN AND HIGH ENERGY RADIATION
Thermal Degradation, Oxidation Reactions, Degradation by High Energy Radiation

13. MECHANICAL PROPERTIES OF MOLDED PHENOLIC RESINS

14. MECHANICAL PROPERTIES OF LAMINATED PHENOLIC RESINS

15. MODIFIED AND THERMAL-RESISTANT RESINS
Etherification Reactions, Esterification Reaction, Boron-Modified Resins, Silicon-Modified Resins, Phosphorus-Modified Resins, Heavy Metal-Modified Resins, Nitrogen-Modified Resins, Sulfur-Modified Resins

16. COMPOSITE WOOD MATERIALS

17. MOULDING COMPOUNDS
Standardization and Minimum Properties, Composition of Molding Powders, Resins, Fillers, Reinforcements and Additives, Wood Flour and Cellulose Fibers, Asbestos, Mineral Flour, Other Fillers and Fibers, Colorants,
Lubricants and Release Agents, Production of Molding Powders, Thermoset Flow, Manufacturing of Molded Parts, Compression Molding, Transfer Molding, Injection Molding, Selected Properties, Thermal Resistance, Shrinkage and Post-Mold Shrinkage, Thermal Expansion

18. HEAT AND SOUND INSULATION MATERIALS

19. THERMAL PROPERTIES OF PHENOLIC RESINS
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20. CHEMICAL RESISTANCE OF PHENOLIC RESINS
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23. PHENOLIC RESINS IN RUBBERS AND ADHESIVES

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26. TECHNICAL MANUFACTURE OF PHENOLIC RESINS
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27. MOULDING TECHNIQUE FOR PHENOLIC RESINS
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Chemical Reactor
Reaction Vessel
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Jacketed reaction Vessel
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Blending Tank
Buffer Tank
Condenser
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NIIR PROJECT CONSULTANCY SERVICES , 106-E, Kamla Nagar, New Delhi-110007, India. Email:npcs.india@gmail.com Website: NIIR.org

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