The Complete Book on Water Soluble Polymers

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Water soluble polymers cover a wide range of highly varied families of products of natural or synthetic origin, and have numerous uses. A water soluble polymer is a polymer that can be diluted in water, with or without the assistance of co solvents and neutralizing agents, to form transparent solutions. They may be classified into two types, totally synthetic polymers and natural products together with their chemically modified derivatives and further can be grouped into three main headings; naturally occurring, semi synthetic and completely synthetic polymers. The water based polymers are quick drying non inflammable, having mild odour and more environmentally acceptability than any other polymers. Most conventional coating polymers at present can be produced in a form that will allow them to be solubilized in water. These include alkydes, polyesters, acrylics epoxies. There are various types of polymerization methods of water soluble polymers such as bulk polymerization, solution polymerization, copolymerization, emulsion polymerization and suspension polymerization. Water soluble polymers are used widely as stabilizers or protective colloids in emulsion polymerization. Its most common use are gum acacia, starch either etherified or in its degraded form, dextrin, polyvinyl alchohol and hydroxyethyl cellulose. Polymers find many applications in oil recovery and production, including areas such as; drilling fluids, cementation of well bore, reservoir fracturing, controlling fluid flow in the reservoir and multistage processes of oil production and refining. The water soluble polymers market encompasses several categories, including starch, cellulose ethers, polyvinylacetate, polyvinyl alcohol and other synthetic water soluble polymers. The starch market is the largest.

This book basically deals with flow characteristics of water soluble polymer solutions, emulsion polymerization, water reducible resins, silicone modified alkyds and polyesters, cross linking of water soluble coatings, formulation of water soluble coatings, trouble shooting with water soluble polymers, acrylic solution resins, polyvinylpyrrolidone, commercial uses: compounding and formulating adhesives, methods of polymerization, methods for polymerization of acrylamide, fabrication of water soluble polymers, excluded volume interactions of neutral polymers etc.

The book covers classification of water soluble polymers, processes, properties, uses and applications of water soluble polymers with lot of other information. This book will be very resourceful for new entrepreneurs, existing units, technocrats, researchers and technical libraries.

Synthetic Polymers Natural Products and their Derivatives **Properties of Cellulose Ethers Degree of Polymerization Degree of Substitution** Molar Substitution Application Basic Concepts of Rheology Flow Characteristics of Water Soluble Polymer Solutions Thixotropy Uses Latex Paints **Emulsion Polymerization Other Applications** 2. WATER-REDUCIBLE RESINS History Water-soluble Polymers Maleinized Drying Oils Alkyd Resins Acrylic-modified Water-soluble Alkyds Polyesters Silicone-modified Alkyds and Polyesters **Epoxy Resins** Acrylics Amino Resins Other Water-soluble Polymers **Viscosity Characteristics** Amines Viscosity Drying Stability Gloss Foam Control **Colour Retention** Toxocitv Variation of Amine Levels Cosolvents Coupling Efficiency Viscosity Stability **Drying Properties** Foam Control Driers for Air Dry and Force Dry Systems Cross-linking of Water-soluble Coatings Additives for Coatings **Driers and Drier Accelerators** Surfactants Flow Modifiers Thixotropes and Thickeners Volatile Additives **Piaments** Formulation of Water-soluble Coatings Solubilization of Polymers

Trouble Shooting with Water-soluble Polymers Vehicle Separation Low Opacity Photographing of Surface Defects **Viscosity Variations** Foaming and Air Entrapment Sags and Runs Poor Flow, Levelling and Orange Peel Low Gloss and Micro Wrinkles Flooding and Floating Cratering and Pinholing **Picture Framing and Fat Edges** Blistering and Solvent Popping **3. ACRYLIC SOLUTION RESINS** Terminology **Backbone Monomers Synthesis** Addition Polymerization Copolymerization Thermoplastic Acrylics Selection of Monomer Solution Polymerization Properties and End Uses **Thermosetting Acrylics** Selection of Monomer **Classification and Properties** Acrylamide Copolymers **Acid Copolymers** Hydroxy Copolymers **Curing Reactions Aqueous Solution Acrylics** Non-Aqueous Dispersions (NAD) 4. POLYVINYLPYRROLIDONE Introduction **Chemical Nature Physical Properties** Manufacture **Toxicological Properties PVP** Films Compatibilities **Future Developments** Application of PVP Pharmacy Medicine Beverages **Cosmetics and Toiletries Textiles** Paper Adhesives **Detergents and Soaps Polymers and Polymerization** Agricultural Photography and Lithography

5. POLY (ETYLENE OXIDE) Introduction **Chemical Nature Physical Properties** Manufacture **Biological/Toxicological Properties Rheological Properties** Additives/Extenders Applications **Application Procedures** Commercial Uses: Compounding and formulating Adhesives **Industrial Supplies Constructions Products** Paints and Paint Removers **Pharmaceuticals Printing Products** Soap, Detergents, and Personal – Care Products Water-Soluble Films **Commercial Uses: Processing Aids** Binder **Coatings and Sizes** Dispersant Flocculation Hydrodynamic Drag Reduction **Thermoplastics Manufactures** Thickening/Rheology Control Water Retention Industries Using Polyethylene Oxide Formulations Aluminum and Metal Cleaner Calamine Lotion **Denture Flexative Powder Detergent Bars Detergent Liquid** Lithographic Press Dampening Fluid **Micro Encapsulation** Paint and Varnish Remover **Thickened Acetic Acid** Thickened Hydrochloric Acid (Muriatric Acid) **Thickened Sulfuric Acid** Rubber Lubricant (For Mounting of Tires) **Toothpastes** 6. METHODS OF POLYMERIZATION Acrylamide **Initiation Methods Single Component Initiators Redox Initiators** Mechanism of Initiation Dependence of Polymerization on Temperature Propagation and Termination Effect of pH Effect of Monomer Concentration Effect of Polymerization Medium

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- (3) Nonionic
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- (1) Acetone Process
- (2) Prepolymer Mixing Process
- (3) Hot-Melt Process
- (4) Ketamine/Ketazine Process
- (5) Self-Dispersing of Solids
- Chemical Crosslinking
- (1) Blocked Isocyanates
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- (4) Aziridines
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- Factors Influencing Performance
- (1) Type of Polyols
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- (3) NCO/OH Ratio
- (4) Effect of Pendant Functionality
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- (7) Glass Transition Temperature (Tg)
- (8) Molecular Weight
- (9) Intermolecular Forces
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- **Recent Advances**
- (1) Improvement in Storage Stability
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- Epoxy Dispersions
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- Conclusion

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