

# The Complete Technology Book on Expanded Plastics, Polyurethane, Polyamide and Polyester Fibres

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Expanded plastics are also known as foamed plastics or cellular plastics. Expanded plastics can be flexible, semi flexible, semi rigid or rigid. They can also be thermoplastic or thermosetting and can exist as open celled or closed celled materials. Expanded plastics may be prepared from most synthetic and many natural polymers. Most of the industrially important ones are made from polystyrene, polyvinyl chloride, polyurethanes and polyethylene, as well as from resins that derive from phenol, epoxy, etc. Polyurethane (PUR and PU) is polymer composed of a chain of organic units joined by carbamate (urethane) links. Polyurethane polymers are formed by combining two bi or higher functional monomers. One contains two or more isocyanate functional groups and the other contains two or more hydroxyl groups. More complicated monomers are also used. The Polyurethanes are among the most recent additions to the many commercially important classes of polymers. Urethanes can be considered esters of the unstable carbamic acid or amide esters of carbonic acid. A polyamide is a polymer containing monomers of amides joined by peptide bonds. They can occur both naturally and artificially, examples being proteins, such as wool and silk, and can be made artificially through step growth polymerization or solid phase synthesis. Polyamides are commonly used in textiles, automobiles, carpet and sportswear due to their extreme durability and strength. Polyester is a category of polymers which contain the ester functional group in their main chain. Natural polyesters and a few synthetic ones are biodegradable, but most synthetic polyesters are not. Polyester fibres are produced by the melt spinning process. Raw materials are heated to a spinning mass, which is then pressed through spinnerets. Manufacturing techniques are now developed to the point where they can produce fibres adapted to suit the widest possible applications: they can have round, oval or angular profiles, making them firm to the touch. Applications of these polymers are in various fields like rubber industry, textile industry, chemical industries etc.

Some of the fundamentals of the book are epoxy curing system, background, process conditions, polyether polyols with epoxy resins, highlights of the technological achievement, laminates comprising a hard foam layer and a fiber reinforced synthetic resin layer, highlights of the technological achievement, process conditions, plastic deformation, modification of amino polyols with epoxy resins, producing expanded and cured polyester resin, foamed unsaturated polyester resins with gel coat, cross linked polyester, unsaturated polyester compositions with high impact strength, foam crystallization of condensation polymers, acrylate rubber modification of aromatic polyesters etc.

The present book covers processes of expanded plastics, polyurethane, polyamides with other related information required by an entrepreneur. This book is very useful for technocrats,

researchers, entrepreneurs and professionals.

## 1. Polyepoxides and Epoxy Resins

Epoxy Curing System, Background, Process Conditions, Polyether Polyols with Epoxy Resins, Highlights of the Technological Achievement, Laminates Comprising a Hard Foam Layer and a Fiber-reinforced Synthetic Resin Layer, Highlights of the Technological Achievement, Process Conditions, Plastic Deformation, Modification of Amino Polyols with Epoxy Resins

## 2. Polyamides and Polyimides

Polyamides, High Impact Polyamides, Highlights of the Technological Achievement, Background, Process Conditions, Flameproof Polyamide Molding Compositions, Linear, Flexible, High Tensile Strength Copolyamides, POLYIMIDES, Fire-Retardant Imide Copolymers, Closed Cell Polyimides

## 3. Polyesters

Producing Expanded and Cured Polyester Resin, Foamed Unsaturated Polyester Resins with Gel Coat, Crosslinked Polyester, Unsaturated Polyester Compositions with High Impact Strength, Foam Crystallization Of Condensation Polymers, Acrylate Rubber Modification of Aromatic Polyesters

## 4. Processing

Flame Retardance, Low Molecular Weight Polyurethane Modifier Compounds Yielding Flame Retardance, Highlights of the Technological Achievement, Background, Process Conditions, The Modifier Compound, Low Fire Hazard Rigid Polyurethane Insulation Foam, Intumescent Flexible Polyurethane Foam, Reduced Tendency to Form Embers When Burned, Flame Retardant Flexible Polyurethane Foam Containing Finely Divided Inorganic Salt, Stabilization of Flame Retardant Premix, Flame-and-Smoke Retardant Non-shrinkable Polyurethane Foam, Catalysts, Use of Catalysts Containing Tertiary Nitrogen, Rigid, Semi-Rigid and Flexible Polyurethane Foams from Guanidine and Thiourea Catalysts, Co-Catalyst, N,N,N',N'-Tetramethyl- $\alpha,\omega$ -Polymethylenediamines as Catalysts, Foam Preparation Methods, Polyol R, Flexible Foam Preparation, Rigid Foam Preparation, Experimental Results, Evaluation, Catalyst System for RIM Elastomers, Preferred Embodiment, Flexible and Rigid Foams, Flexible Polyurethane Foam Prepared from a Reaction Mixture Which Includes a Polyether Triol, Stabilization of High Resilience Polyurethane Foam, Flexible Polyurethane Foams with Improved Thermal and Oxidative Stability, Siloxane Copolymer Mixtures in High Resilience Polyurethane Foam, Rigid Shrink Stable Polyurethane Foam Derived from an Adduct of an Alkylene Oxide, Rigid and Semiflexible Polyurethane Foams Produced with Phenol-Aldehyde-Amine Resins, Flexible Foams with High Resiliency, Imparting Special Properties, Carbamylbiuret-Modified Polyisocyanates, Antistatic Polyurethane Foams, Surface Resistances at 25% Relative Humidity and 23°C of Polyurethane Foams, Dispersible Vinylidene Chloride Polymer Microgel Powders as Additives for Polyurethane Foam, Reducing the Molecular Weights of Polyurethane Polymers to Desired Levels in Polyurethane Foam from an Oxyalkylated Product, Polyurethane Foam Prepared from a Copolymer/Polyol Composition, Molding, Preparing Foams with Internal Mold-Release Agents, Molding a Rigid Integral Skin Foamed Resin Product, Biomasses, Enzymes and Polypeptides, Polyurethane Containing Polypeptides, Polyurethane Plastics in Which Polyisocyanates Are Reacted with Reactive Organic Fillers Comprising Biomasses, Preparation and Use of Enzymes Bound to Polyurethane, Reclamation of Products, Reclaiming Polyurethane Foam, Polyol Recovery from Polyurethane Foam Comprising Alcohol and Steam Hydrolysis, Formulation of Flexible Polyurethane Foam, Applications, Reinforced Foamed Resin Structural Material, Polyurethane Binders, Polyurea Polyurethane Foamed Sponge with High Wet Strength, Odorant Hydrophilic Foam Compositions, Articles Coated with a Crushed Foam, Bonding Polyurethane Sheeting to Acrylic or Polyurethane Sheeting in Production of Transparent Windows, Forming a Layer of Blown Cellular Polyurethane on a Carpet Backing, Reinforced Polyurethane Foams, Reaction Injection Molded Polyurethane, Making Castings of Thermosetting Polyurethane Materials,

Comparison, Water Skis Having a Reinforced, Foamed-in-Place, Plastic Hull Bonded to an Aluminum Deck

#### 5. Polyolefins

Processing, Ethylenic Polymer Foams Having Improved Dimensional Stability, Crosslinking/Foaming of Low Density Polyethylene Using Linear Peroxyketals, Foaming Synthetic Resin Compositions Stabilized with Certain Higher Ethers, Esters or Anhydrides, Polyolefin Foam with Small Uniform Cell Size, Preferred Embodiment and Comparative Example, Continuous Production of Foamed Polyethylene Films, Reducing the Aging Period of Polyethylene Foams, Crosslinked Chlorinated Polyethylene Foam, Applications, Fire-Retardant Anhydride Copolymers, Foamable Copolymers, Closed Cell Foamed Films and Sheets

#### 6. Types of Polyamide Compositions

Polyamide-polyester Blends , Allied Chemical Process, Eastman Process, Firestone Process, Teijin Process, Toyo Rayon Process, Polyamide- Polyester-polyether Blends, Kaneafuchi Process, Aromatic Copolyamides , Du Pont Process -, Partially Aromatic Polyamides , Allied Chemical Process, Toyo Rayon Process, Vinyl Modified Polyamides , Esso Process, Inventa Process

#### 7. Polycondensation

Feed Materials, Du Pont, Reactor Design and Operation, American Enka, Chatillon, Eastman Kodak, Farbwerke Hoechst, Goodyear Tire & Rubber, Imperial Chemical Industries, Inventa AG, Mobil Oil, Monsanto, NV Onderzoekinstituut Research, Teijin Ltd., Toray Industries, Vereinigte Glanzstoff-Fabriken AG, Vickers-Zimmer AG, Catalysts Employed, Allied Chemical, American Enka, Bemberg SpA, Eastman Kodak, Forben-fabriken Bayer AG, FMC, Gevaert-Agfa NV, Hercules, Kalle AG, Monsanto, Societe Rhodiaceto, VEB Chemiefaserwerk â€œFriedrich Engelsâ€•

#### 8. Fiber Production

Compositions, Celanese, Du Pont, Eastman Kodak, Societe Rhodiaceta, Spinning, Farbwerke Hoechst, Fiber industries, FMC, Imperial Chemical Industries, Monsanto, Drawing, Farbwerke Hoechst, Imperial Chemical Industries, Monsanto, Societe de la Viscose Suisse, Teijin Ltd., Vickers-Zimmer AG, Fiber Treatment , Celanese, Deering Milliken Research, Farbwerke Hoechst, Goodyear Tire & Rubber, Imperial Chemical Industries, Composite Yarn Production, Toray Industries, Future Trends

#### 9. Integrated Polyester Production Processes

Du Pont, Fiber Industries, Goodyear Tire and Rubber, Monsanto, Werner & Pfleiderer

#### 10. Prepolymer Production

Reactor Design and Operation, Du Pont, Eastman Kodak, Inventa AG, Mobil Oil, Monsanto, Teijin Ltd., VEB Chemiefaserwerk â€œFriedrich Engelsâ€•, Vickers-Zimmer AG

#### 11. Fiber Production Process

Compositions Used, British Nylon Spinners Process, Du Pont Process, Firestone Process, Glanzstoff Process, Imperial Chemical Industries Process, Kanegafuchi Process, Konegafuchi/Snia Viscosa Process, Monsanto Process, Teijin Process, Melt-spinning Processes, Allied Chemical Process, British Nylon Spinners Process, Carl Freudenberg Process, Du Pont Process, Fiber Industries Process, Firestone Process, Imperial Chemical Industries Process, Monsanto Process, Solution Spinning Processes, Celanese Wet-Spinning Process, Drawing Processes, Du Pont Process, Monsanto Process, Snia Viscosa Process, Fiber After Treatment

## About NIIR

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