

The Complete Technology Book on Industrial Polymers, Additives, Colourants and Fillers

Author:- NIIR Board of Consultants & Engineers

Format: paperback

Code: NI180

Pages: 512

Price: Rs.1100US\$ 125

Publisher: NIIR PROJECT CONSULTANCY SERVICES

Usually ships within **5** days

The Indian plastic and polymer industry has taken great strides. In the last few decades, the industry has grown to the status of a leading sector in the country with a sizable base. The material is gaining notable importance in different spheres of activity and the per capita consumption is increasing at a fast pace. Numerous plastics and fibers are produced from synthetic polymers; containers from propylene, coating materials from PVC, packaging film from polyethylene, experimental apparatus from Teflon, stockings from nylon fiber, there are too many to mention them all. The reason why plastics are popular is that they may offer such advantages as transparency, self lubrication, light weight, flexibility, economy in fabricating and decorating. Properties of plastics can be modified through the use of fillers, reinforcing agents and chemical additives. Silicones are by far the most important industrial polymers and are based on silicon, an element abundantly available on our planet. Polymers are classified in three broad groups; addition polymers, condensation polymers and special polymers. It is well known that the major consumption of additives is in PVC compounds. Approximately 80% of additives are being used in PVC; however the left over 20% is consumed in compounding of other thermoplastics. Plastic master batches and fillers have their own importance in plastic processing industries. Colorants are the materials that give colour and opacity to plastics are chemically characterized as either pigments or dyes. Pigments are finely pulverized natural or synthetic particles which may be of inorganic or organic origin and insoluble in the matrix in which they are dispersed. Permanent red 2B is a mono azo pigment that is widely used in thermoplastics because it is inexpensive and has high tinting strength and good bleed resistance. Fillers are commonly employed in opaque PVC compounds to reduce cost and to improve electrical insulation properties, to improve deformation resistance of cables, to increase the hardness of a flooring compound and to reduce tackiness of highly plasticized compounds. Various calcium carbonate are used for general purpose work, china clay is commonly employed for electrical insulation, and asbestos for flooring applications. Also employed occasionally are the silicas and silicates, talc, light magnesium carbonate and barites (barium sulfate). Polymer Energy system is an award winning, innovative, proprietary process to convert waste plastics into renewable energy. Polymers are the most rapidly growing sector of the materials industry. No wonder polymers are found in everything from compact discs to high tech aerospace applications. On the basis of value added, Indian share of plastic products industry is about 0.5% of national GDP.

Some of the astonishing fundamentals of the book are industrial polymers, addition polymers polyolefins, polyethylene, chlorinated polyethylene, cross linked polyethylene, linear low density polyethylene (LLDPE), high molecular weight polyethylene, high density polyethylene, ultrahigh

molecular weight polyethylene, polypropylene, poly(vinyl chloride), stabilizers, plasticizers, extenders, mineral filled or glass bead/milled glass grades, antistatic/electro conductive grades, electroplatable grades, etc.

The present book enlightens the processing of industrial polymers, additives, colourant and fillers. This book is an invaluable resource to new entrepreneurs, technocrats, researchers, professionals etc.

1. INDUSTRIAL POLYMERS

INTRODUCTION

PART I: ADDITION POLYMERS

POLYOLEFINS

Polyethylene

Chlorinated Polyethylene

Cross-Linked Polyethylene

Linear Low-Density Polyethylene (LLDPE)

High-Molecular-Weight High-Density Polyethylene

Ultrahigh-Molecular-Weight Polyethylene

Polypropylene

Poly(Vinyl Chloride)

Stabilizers

Plasticizers

Extenders

Lubricants

Fillers

Pigments

Impact Modifiers and Processing Aids

Properties and Applications

Pastes

Poly(Vinylidene Chloride)

Polytetrafluoroethylene

Processing

Applications

Polyisobutylene

Polystyrene

Polybutadiene (Butadiene Rubber)

Polyisoprene

Polychloroprene

OLEFIN COPOLYMERS

Styrene-Butadiene Rubber

Nitrile Rubber

Ethylene-Propylene Elastomer

Butyl Rubber

Thermoplastic Elastomers

Styrene-Diene-Styrene Triblock Elastomers

Thermoplastic Polyester Elastomers

Thermoplastic Polyurethane Elastomers

Thermoplastic Polyolefin Elastomers

Ionic Elastomers

Fluoroelastomers

Styrene-Acrylonitrile Copolymer

Acrylonitrile-Butadiene-Styrene Terpolymer

Ethylene-Methacrylic Acid Copolymers (Ionomers)

Ionomers

ACRYLICS

Polyacrylonitrile

Polyacrylates

Polymethacrylates

Polyacrylamide

Poly(acrylic acid) and Poly(methacrylic acid)

Acrylic Adhesives

VINYL POLYMERS

Poly (Vinyl Acetate)

Poly(Vinyl Alcohol)

Poly(Vinyl Acetals)

Poly(Vinyl Cinnamate)

Poly(Vinyl Ethers)

Poly(Vinyl Pyrrolidone)

Poly(Vinyl Carbazole)

PART II: CONDENSATION POLYMERS

POLYESTERS

Poly(Ethylene Terephthalate)

Poly(Butylene Terephthalate)

Poly(Dihydroxymethylcyclohexyl Terephthalate)

Unsaturated Polyesters

Polyester-Glass-Fiber Laminates (GRP, FRP)

Polyester Molding Compositions

Aromatic Polyesters

Wholly Aromatic Copolyester

Polycarbonates

POLYAMIDES

Aliphatic Polyamides

Properties

Applications

Aromatic Polyamides

Polyimides

Modified Polyimides

FORMALDEHYDE RESINS

Phenol-Formaldehyde Resins

Resols

Novolac

Urea-Formaldehyde Resins

Molding Powder

Processing

Properties and Applications

Melamine-Formaldehyde Resins

POLYURETHANES

Polyesters

Polyethers

Polycaprolactone

Polyurethane Rubbers and Spandex Fibers

Cross-Linked Polyurethane Rubbers

(a) Prepolymer formation

(b) Chain extension of prepolymer

(c) Cross linking of chain-extended polyurethane

Thermoplastic Polyurethane Rubbers

Spandex Fibers
Flexible Polyurethane Foam
Applications
Rigid and Semirigid Polyurethane Foams
Polyisocyanurates
Polyurethane Coatings
ETHER POLYMERS
Polyacetal
Poly(Ethylene Oxide)
Applications
Polyethylene Glycol
Poly(ethylene Oxide)
Poly [Propylene Oxide]
Epoxy Resins
Resin Preparation
Curing
Other Epoxies
Applications
POLY(PHENYLENE OXIDE)
CELLULOSIC POLYMERS
REGENERATED CELLULOSE
Cellulose Nitrate
Cellulose Acetate
Other Cellulose Esters
Cellulose Ethers
PART III: SPECIAL POLYMERS
Heat-Resistant Polymers
POLY(PHENYLENE SULFIDE)
POLYSULFONE
Properties
Polyether Ether Ketone
Polybenzimidazole
SILICONES AND OTHER INORGANIC POLYMERS
Silicones
Silicone Fluids
Silicone Resins
Silicone Rubbers
Polyphosphazenes
Polythiazyl
FUNCTIONAL POLYMERS
Ion-Exchange Resins
Applications
Polymeric Reagents
Photoconductive Polymers
Electroconductive Polymers
Light-Sensitive Polymers
Piezoelectric Polymers
2. POLYETHYLENE, HIGH DENSITY (HDPE)
INTRODUCTION
CATEGORY
HISTORY
POLYMERIZATION
DESCRIPTION OF PROPERTIES

APPLICATIONS

ADVANTAGES/DISADVANTAGES

Advantages

Disadvantages

PROCESSING TECHNIQUES

Processability of HDPE

RESIN FORMS

SPECIFICATION OF PROPERTIES

Master Outline of Materials Properties

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

SHRINKAGE

Mold Shrinkage Characteristics

3. ACETALS

ACETAL

CATEGORY

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

Specialty Grades

Reinforced Grades

Mineral-filled or Glass Bead/Milled Glass Grades

Antistatic/Electroconductive Grades

Electroplatable Grades

APPLICATIONS

ADVANTAGES/DISADVANTAGES

PROCESSING TECHNIQUES

Standard design chart for Acetal

Master Material Outline

RESIN FORMS

SPECIFICATION OF PROPERTIES

Master Outline of Materials Properties

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

SHRINKAGE

Standard Tolerance Chart

4. ALLYL RESINS (DAP/DAIP)

INTRODUCTION

CATEGORY

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

Mechanical Properties

Thermal Properties

Reinforcements

APPLICATIONS

Reinforced Laminates

Decorative Laminates

ADVANTAGES/DISADVANTAGES

PROCESSING TECHNIQUES

RESIN FORMS

SPECIFICATION OF PROPERTIES

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

SHRINKAGE

5. FLUOROPOLYMERS, POLY(VINYLDENE

FLUORIDE) (PVDF)

POLY(VINYLDENE FLUORIDE)

CATEGORY

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

Thermal Properties

Mechanical Properties

Optical Properties

Environmental Properties

APPLICATIONS

ADVANTAGES/DISADVANTAGES

PROCESSING TECHNIQUES

RESIN FORMS

SPECIFICATION OF PROPERTIES

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

SHRINKAGE

6. IONOMERS

IONOMER

CATEGORY

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

APPLICATIONS

ADVANTAGES/DISADVANTAGES

PROCESSING TECHNIQUES

RESIN FORMS

SPECIFICATION OF PROPERTIES

PROCESSING REQUIREMENTS

Film Extrusion

Injection Molding

PROCESSING-SENSITIVE END PROPERTIES

Moisture Absorption

Effect of Temperature on the Melt Flow

SHRINKAGE

7. POLYAMIDE-IMIDE (PAI)

STRUCTURE

CATEGORY

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

APPLICATIONS

ADVANTAGES/DISADVANTAGES

PROCESSING TECHNIQUES

RESIN FORMS

SPECIFICATION OF PROPERTIES

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

SHRINKAGE

8. POLYBUTYLENE (PB)

STRUCTURE

CATEGORY

HISTORY

POLYMERIZATION

PROPERTIES

APPLICATIONS

ADVANTAGES AND DISADVANTAGES

PROCESSING TECHNIQUES

RESIN FORMS

SPECIFICATION OF PROPERTIES

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

SHRINKAGE

9. POLYCARBONATE (PC)

POLYCARBONATE

CATEGORY

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

APPLICATIONS

ADVANTAGES/DISADVANTAGES

PROCESSING TECHNIQUES

RESIN FORMS

SPECIFICATION OF PROPERTIES

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

SHRINKAGE

10. POLYETHYLENE LINEAR LOW

DENSITY (LLDPE)

INTRODUCTION LLDPE

CATEGORY

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

APPLICATIONS

ADVANTAGES/DISADVANTAGES

PROCESSING TECHNIQUES

RESIN FORMS

SPECIFICATION OF PROPERTIES

PROCESSING REQUIREMENTS

PROCESSING-SENSITIVE END PROPERTIES

11. FLEXIBLE POLY (VINYL CHLORIDE) (FPVC)

INTRODUCTION

CATEGORY

Vinyl Additives

HISTORY

POLYMERIZATION

DESCRIPTION OF PROPERTIES

Physical Properties

Thermal Properties

Mechanical Properties

Optical Properties

Environmental Properties
APPLICATIONS
ADVANTAGES/DISADVANTAGES
PROCESSING TECHNIQUES
RESIN FORMS
Additives
Polyblends
SPECIFICATION OF PROPERTIES
PROCESSING REQUIREMENTS
PROCESSING-SENSITIVE END PROPERTIES
SHRINKAGE
12. FILLERS, CALCIUM CARBONATE
CATEGORY
SOURCE
KEY PROPERTIES
PROCESSING CHARACTERISTICS
APPLICATIONS
COMMERCIAL GRADES
COMPOSITES CHARACTERISTICS
13. FILLERS, KAOLIN
AIR-FLOATED KAOLIN
WATER-WASHED KAOLIN
CALCINED KAOLIN
SURFACE-MODIFIED KAOLINS
14. FILLERS, MICA
CATEGORY
SOURCE
KEY PROPERTIES
PROCESSING CHARACTERISTICS
APPLICATIONS
COMMERCIAL GRADES
COMPOSITE CHARACTERISTICS
15. COLORANTS
INTRODUCTION
Color and its Measurements
Light
Colorants
PIGMENTS AND DYES
Major Organic Pigments
Inorganic Pigments
Characteristics of Dyes
Colorant Forms and Functions
The Importance of Dispersion
Coloring DoTMs and DontTMs
Color Measurement and Matching
16. FILLERS, ALUMINA TRIHYDRATE (ATH)
CATEGORY
SOURCE
KEY PROPERTIES
PROCESSING CHARACTERISTICS
APPLICATIONS
POLYMERS FILLED
Unsuaturated polyester

Epoxy
Cross-Linked Ethylene-Vinyl Acetate
Urethane
EPDM
PVC
Polyethylene
COMMERCIAL GRADES
COMPOSITE CHARACTERISTICS
17. ACRYLONITRILE-BUTADIENE-
STYRENE (ABS)
INTRODUCTION
CATEGORY
POLYMERIZATION
Chemistry
Other Monomers
Compounding
Pricing
PROPERTIES
Impact Resistance
Strength
Creep and Stress Relaxation
Fatigue
Heat Deflection
Flammability
Optical Properties
Ultraviolet Resistance
Chemical Resistance
Reinforcement
APPLICATIONS
Appliances
Automotive
Building and Construction
Business Machines/Consumer Electronics
Other Applications
ADVANTAGES/DISADVANTAGES
PROCESSING TECHNIQUES
Injection Molding
Extrusion
Thermoforming
Cold Forming
RESIN FORMS
MATERIAL PROPERTIES
PROCESSING REQUIREMENTS
Drying
Degradation
Regrind
PROCESSING-SENSITIVE END PROPERTIES
Molding Conditions to Maximize Specific Properties
Thermoforming
SHRINKAGE
18. FILLERS, FIBER GLASS
CATEGORY
SOURCE

KEY PROPERTIES
PROCESSING CHARACTERISTICS
APPLICATIONS
POLYMERS FILLED
COMMERCIAL GRADES
COMPOSITE CHARACTERISTICS
19. POLYETHYLENE, LOW DENSITY (LDPE)
INTRODUCTION
CATEGORY
POLYMERIZATION
DESCRIPTION OF PROPERTIES
APPLICATIONS
ADVANTAGES/DISADVANTAGES
RESIN FORMS
SPECIFICATION OF PROPERTIES
PROCESSING REQUIREMENTS
PROCESSING-SENSITIVE END PROPERTIES
SHRINKAGE
20. FILLERS, CALCIUM SULFATE
CATEGORY
Source
KEY PROPERTIES
PROCESSING CHARACTERISTICS
APPLICATIONS
Polyester Resin Systems
Laminate Sheet
Bulk Molding Compound
PVC Molding Compounds
PVC Plastisols
POLYMERS FILLED
Thermoplastics
Thermosets
COMMERCIAL GRADES
COMPOSITE CHARACTERISTICS

About NIIR

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, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting

up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes various process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

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

Email: npcs.india@gmail.com **Website:** NIIR.org

Thu, 01 May 2025 08:44:35 +0000