Speciality Plastics, Foams (Urethane, Flexible, Rigid) Pet & Preform Processing Technology Handbook

Author:- NIIR Board of Consultants & Engineers
Format: paperback
Code: NI156
Pages: 672
Price: Rs.1275**US$** 125
Publisher: NIIR PROJECT CONSULTANCY SERVICES
Usually ships within **5** days

Plastic technology is one of the fields where people can show their ability and performance both theoretically and practically. 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. Continuous advancements and developments in polymer technology, processing machineries, expertise and cost effective manufacturing is fast replacing the typical materials in different segments with plastics. Some examples of the specialty plastics are polytetra fluoroethylene (PTFE) , thermoplastic polyurethanes (TPU), polysulphones (PSO), polyester sulphone (PES), polyarylates, polyamide imide (PAI), etc. Polyurethane 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. Urethane foam is an artificial material with several different uses. The manufacturing process can produce foams of varying densities and flexibilities. This means it can serve functions as diverse as bedding, packaging and footwear. It is important to note that urethane foam is most commonly used to refer to a material made from polyurethane. Furniture, bedding, automotive interiors, energy management, footwear and insulation utilize flexible foam technology due to its wide range of density, cushioning ability and versatility of use. Appliance (refrigeration, water heaters), construction panels, roofing boardstock, and spray applied insulation utilize rigid polyurethane foam due its superior insulating and mechanical properties to reduce energy consumption and enhance structural integrity of the finished product. The versatility of the technology and processability makes rigid polyurethane foam uniquely suited for other applications, like architectural molding, energy absorbing materials in automobiles, entry doors, and even picnic coolers. 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.

Some fundamentals of the book are properties and applications of speciality plastics, thermoplastic polyurethanes, formation of urethane foams, flexible foams, variables in the preparation of prepolymers, procedures for the preparation of prepolymers, catalyzed prepolymer preparation, application of flexible foams, applications of rigid foams, one-stage injection stretch blow moulding, pet material and applications, injection and co-injection preform technologies, pet film and sheet, plastics as safe & hygienic medium for packaging food & food products

The book covers processes and other required information for the manufacturing of different specialty plastics, Foams, PET and Pre form PET etc. This is very useful book for new entrepreneurs, technocrats, existing units, institutional libraries etc.

6. Effect of catalysts
7. Effect of Agitation
8. Effect of Reactor size
B. Procedures for the preparation of prepolymers
1. Batch Procedures
2. Preparation of Prewolymer with Biuret Branching
3. Preparation of Prepolymer with Allophanate Branching
4. Preparation of Prepolymer with Urethane Branching
5. Preparation of Polyester Prepolymer
6. Preparation of Castor Oil-Based Prepolymers
7. Batch Plant Process for Polyether Prepolymers
8. Catalyzed Prepolymer Preparation
9. Stabilization of Prepolymers
C. Foaming of prepolymers
1. Free Isocyanate Content
2. Water
3. Surface Active Agents
4. Catalysts
5. Other Additives
Plasticizers
Pigments and Fillers
Flame Retardants
3. Semi-Prepolymers
4. One-shot Foams
1. Chemical varitions
Effect of water
Effect of Catalysts
Effect of Emulsifiers and Additives
2. Mechanical Variations
3. Physical Variations
4. Formulation Variations
B. Variables in the preparation of one-shot Polyether Foams
1. Effect of Polyols
2. Effect of Diisocyanate
3. Effect of Blowing Agents
4. Effect of Catalysts
5. Effect of Silicones
6. Effect of Filters and Additives
7. Formulation Variations
Methods of Foam Application
1. Foaming Equipment
2. Manufacture of Slab Stock
A. Foam Production
B. Sectioning of Slab Stock
C. Counter Shaping
D. Post-Forming
3. Molding of Flexible Foam
4. Frothing of Flexible Foams
5. Foaming of Urethane Elastomers
6. Spraying of Flexible Foams
Properties of Flexible Foams
1. General Properties
2. Specific Properties

A. Aging of Flexible Foam
B. Sound Absorption
C. Low and High Temperature Properties
D. Solvent and Chemical Resistance
E. Oxidation and Untraviolet Resistance
F. Flammability of flexible Urethane Foams
G. Fatigue Properties
Application of Flexible Foams
1. Furniture
2. Bedding
3. Transportation
A. Automotive
B. Aircraft
C. Public Seating
4. Packaging
5. Clothing, Textile and Miscellaneous Foam Laminates
6. Carpet Underlay
7. Sporting goods
8. Toys and Novelties
9. Sponges and Miscellaneous Household Items
10. Filtering Materials
11. Construction, Insulation and Miscellaneous Uses
12. Military and Missile Uses
13. Horticultural
14. Footwear
15. Medical
Miscellaneous Flexible Foam Systems

4. RIGID FOAMS
Introduction
1. Raw Material used in Rigid Foams
1. Isocyanates
2. Polyols
3. Blowing Agents
4. Catalysts
5. Surfactants
6. Flame Retardants
7. Miscellaneous Additives
Foam System
1. Polymer Preparation
A Semi-Prepolymer
B. Complete Prepolymer
C. One-shot Systems
2. Foam Preparation
A. Effect of Isocyanate Variations
B. Effect of Polyol Variations
C. Effect of Blowing Agents
D. Effect of Catalysts
E. Effect of Surfactants
F. Effect of Fillers
G. Flame Retardants
Methods of Foam Production
1. Batch Preparation

2. Continuous of Intermittent Pouring
A. Nonfroth Systems
Metering Equipment
Mixing of Components
B. Frothing System
3. Spraying
4. Production of Finished Foam
A. Continuous Slab Production
B. Molding Operations
C. Foming-in-Place
Foam Properties
1. Genral Properties
2. Specific Properties
A. Coefficient of Expansion
B. Service Temperature
C. Closed Cell Content
D. Thermal Insulation
E. Adhesion to Various Substrates
F. Water Absorption
G. Water Vapor Permeability
H. Humid Aging
I. Solvent Resistance
J. Electrical Properties
K. Sound Insulation
L. Fungus Resistance
Applications of Rigid Foams
1. Refrigeration Insulation
2. Refrigerated Trucks and Trailers
3. Insulation of Pipes and Tanks
4. Structural Uses
5. Uses in the Aircraft Industry
6. Military Uses
7. Void Filling and Insulation of Ships
8. Uses in Packaging
9. Uses in the Electric Industry
10. Aerospace Applications
11. Miscellaneous Uses
Miscellaneous Foaming Systems
5. ONE-STAGE INJECTION STRETCH BLOW MOULDING
Introduction
One-Stage Machines
1. One-Stage Machine Construction
Process Stations on one-Stage Machine
1. Injection mould and hot runner
A. Process conditions affecting perform quality
2. Conditioning Station
3. Blowing Station
Integrated Two-Stage machines
Dying System
1. Requirements for a reliable drying system
2. Drying process monitoring
Preform Design
1. Neck finish

2. Preform weight
3. Cycle time and preform wall thickness
4. Stretch rations
5. Injection mould design and manufacture
6. Preform design for varying container sizes
7. Preform weight adjustment
8. Difference between one- and two-stage preform designs
Container Design
Hot-Fill Pet Bottles
Quality Control Procedures
Preform Examination
1. Appearance and shape
2. Preform weight
3. Neck dimensions
4. Preform eccentricity
5. Polarised light inspection
6. Intrinsic Viscosity (IV)
7. Actetaldehyde (AA)
Container Examination
1. Shape and appearance
2. Dimensions
3. Capacity
4. Container wall thickeness and material distribution
5. Top load strength
6. Impact resistance (drop) test
7. Leakage of liquid (seal integrity)
8. Vacuum strength
9. Acetaldehyde (AA)
10. Oxygen permeation
11. Moisture Vapour transmission rate
12. Product filling temperature
13. Container weight
Bottles for Carbonated Beverages
1. Burst pressure
2. Thermal stability
3. Carbon retention
Additional Tests for Hot-Fill containers
Additional Tests for Returnable/reffillable Pet Bottles

6. INJECTION BLOW MOULDING
Introduction
Basic Principles
History
Commercial Processes
1. Rotary table machines : Jomar, Uniloy and similar
Tooling
Procrea
Material
Applications
Machine and Process Capabilities

7. PET MATERIAL AND APPLICATIONS

Introduction
Polymerisation and Manufacturing Processes
1. Manufacturing plants
Structures, Morphology and Orientation
1. Structure
2. Morphology
3. Orientation
4. Creep
Properties
1. Molecular weight and intrinsic viscosity
2. End group
3. Thermal properties
2. End group
3. Thermal properties
Rheology and Melt Viscosity
1. Melt viscosity
2. Melt Flow
3. Moulding Shrinkage
Moisture Uptake and Polymer Drying
1. Moisture level
2. Polymer drying
Degradation Reactions
1. Thermal and thermal oxidative degradation
2. Environmental Degradation
Reheat Characteristics
Gas Barrier properties
Amorphous Polyesters
1. Homopolymers
2. Low copolymers
3. Medium copolymers
4. High copolymers
Crystalline polymers
Polymer Blends
Applications
Trends
Globals

8. INJECTION AND CO-INJECTION PREFORM TECHNOLOGIES
Multilayer Characteristics
Applictions
1. Performance-Driven Applications
2. Economics - or Legislative-Drive Applications
3. Combination Applications
Closure vs Bottle Permeation
Container Performance
1. Barrier properties
2. Oxygen barrier
3. Carbon dioxide barrier
4. Scavenger property
Wall structure
Preform and Bottle Design
1. Permeation through finish, sidewall and base
2. Controlled fill

Headspace Oxygen Absorption
Oxygen Desorption From Pet
Beer Containers
Small Juice Containers
Small CSD containers
Core layer volumes
Comparison of Co-Injection technologies
Co-Injection Moulding Equipment

9. PET FILM AND SHEET
Introduction
The Film Process
1. Polymer preparation and handling
2. Extrusion and Casting
a. Extrusion
b. Casting
3. Drawing
a. The forward draw preheat (FWDPH)
b. The forward draw (FWD)
c. The sideways draw preheat (SWDPH)
d. The sideway draw (SWD)
4. Heat Setting
5. Slitting and Winding
a. In line slitting and knurling
b. Winding conditions
6. Reclaim and recovery
Polymer, Process and Properties (3ps)
1. Polymer
2. Process
3. Properties
Surface and Bulk Properties
1. Film properties
2. Coating
3. Co-extrusion
4. Fillers
5. Shrinkage
6. Combination of effects
PET Sheet
1. Extrusion of PET sheet
2. Thermoforming of CPET sheet
4. Material
5. New developments
Conclusion-Film

10 PLASTICS AS SAFE & HYGIENIC MEDIUM FOR PACKAGING FOOD & FOOD PRODUCTS
Glimses of Modern India
Views & changing practices
Scarcity among plenty
Consumer market
Food packaging a need
Food Safety The Ultimata
Risk assessment & food packaging regulations

Compatibility studies
Migration modelling
Package Design
Packaging Development Process
Plastics as a Choice
Plastic Use for Packaging in India
Lowest cost packaging
Plastic-Packaging Solution for Food Products
Growing user of plastic in Packaging
Plastics and their present usages
Indian Polymer Demand in KTPA
Plastics reduce post harvest wastage
Wastage of food product in India
Plastic crates for post harvest packing
Polypropylene boxes for horticulture packaging
Plastics in bulk packaging
Bulk Packaging Jute V/s PWS
Suitability of PP/PE Bags for Food Grains & Sugar Storage
Specialized Food Packaging
Case study
Plastics & Food shelf Life
Plastics packaging for sterilized/irradiated food products
National Standards on Packaging code for fresh & Processed Food
Indian Food Laws and Packaging specification
Edible Oil packaging Act
Packaging, Plastics & Environment
IS packaging or plastics the Real Culprit
ECO- Protection programmes
Future: What plastics have to offer

11. TWO STAGE INJECTION STRETCH BLOW MOULDING
Introduction
1. The principles of the Two-stage process
a. Preform moulding
b. Container stretch blow moulding
c. Preform and container design
2. Technological Basics of Pet as a Stretch Blow moulding material
3. Production concepts and target market
Preform Injection Moulding
1. Injection machine concepts
a. Plasticizing
Clamping
2. Mould Design
a. Hot runner system
b. Gates and cavities
Productivity Parameters
a. Cycle time
b. Preform design and key related parameters
c. Preform quality and key related parameters
Stretch Blow Moulding
1. Principles of the two stage stretch blow moulding process
a. Preform reheating
b. Stretch blow moulding

Technologies for thermally stable containers
Thermal relaxation and pre-shrinkage
Hot-fill
Heat-set
Super heat-set
2. Machinery concepts
Mould technology
Preform and Container Design
Container design
Preform design

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 varies 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

Mon, 20 Jan 2025 18:00:04 +0000