

# The Complete Book on Medical Plastics

**Author:** NIIR Board of Consultants & Engineers

**Format:** Paperback

**ISBN:** 8178330008

**Code:** NI172

**Pages:** 368

**Price:** Rs. 975.00 US\$ 100.00

**Publisher:** Asia Pacific Business Press Inc.

Usually ships within **5** days

Plastics currently form one of the most important components of the medical industry. Medical device designers and engineers increasingly prefer plastics to conventional packaging materials such as metals owing to superior flexibility offered by plastics in fabrication process. Advancements in sterilization techniques shift towards disposable devices, development of enhanced plastic materials, and technological innovations are factors driving the overall market growth and expansion. The development of novel materials such as biocompatible polymers for use in medical implants will furthermore provide the required impetus for the global medical plastics market. Every day, plastics are involved in critical surgeries, life saving efforts, and routine medical procedures. Plastic materials can be sterilized hundreds of times without degradation. Lightweight plastics are used to form replacement joints, non surgical supports, and therapy equipment. Clear plastics provide visibility for transfusions, surgeries, and diagnostic equipment of all kinds and plastics can be machined, molded, or formed into almost any shape imaginable. The use of plastics in health care field encompasses several distinct markets. Plastic is used on a large scale as medical devices like disposable syringes, optical and dental products, heart valves, contact lenses and many more medical products. This way plastic has very importance in making medical devices. The medical plastics industry is set to expand rapidly over the next decade taking up increasing proportions of GDP, as countries provide healthcare to an ageing population, access to medicine expands in developing regions and new technology is developed.

This book basically deals with significance of packaging for pharmaceuticals & medical industry, tablets & capsules liquids, creams and ointments, OPVC, OPP and oriented and non oriented pet containers, blister trays for ampoules, cartridge tubes etc., shrink packaging and stretch wrapping, conducting health based risk assessments of medical materials, performance properties of metallocene polyethylene, EVA, and flexible PVC films, polyurethane thin film welding for medical device applications, polyurethane film as an alternative to PVC and latex, opportunities for PVC replacement in medical solution containers, thermoplastic silicone urethane copolymers : a new class of biomedical elastomers, selecting materials for medical products : from PVC to metallocene polyolefins, injection molding engineering plastics, assessing the performance and suitability of parylene coating etc.

The present book contains the important information of plastics in medical field and their uses in various ways. This is very useful book for entrepreneurs, researchers, technocrats and technical institutions.

## Contents

### 1. SIGNIFICANCE OF PACKAGING FOR PHARMA & MEDICAL INDUSTRY

Tablets & Capsules

Liquids

Creams and Ointments

Labels  
Caps & Closures  
Wadding Materials  
Specific New Systems  
Opvc, Opp and Oriented and Non-oriented Pet Containers  
Blister Trays For Ampoules, Cartridge Tubes Etc.  
Single-serve/Unit Dose Packages (Laminates of PPR, Plastics and Foil)  
The Delcap Metered-dose  
Form, Fill, Sealing of Plastic Bottles Under Aseptic Condition  
Radiation Resistant PP Bottles  
Double Derker Spray-aerosol  
Single Dose Blister-break Open Packs  
Capped Gabletop Cartons  
Refillable, Reusable and Recyclable Aerosols  
Shrink Packaging and Stretch Wrapping  
Bulk Drug and Fine Chemicals  
Packaging of Medical Devices  
Materials & Technologies  
Tyvek  
Dot Coat Advantages  
Tyvak vs. Paper  
Peelable Paper Lidding Materials  
Advantages  
Applications  
Medical Grade Pressure Sensitive Materials  
Advantages  
Applications  
Evoth in Health Care Packaging (HCP)  
Packaging Requirements For Health Care Products  
Structure, Props & Uses  
Barrier Bottles/Vials  
Evoth  
Other Important Area of Use  
Packaging & Sterility  
Plastics and Their Biomedical Applications  
Pharmaceutical & Medical Packaging  
New Development  
Packaging Waste Directive  
The Directive  
Conclusion

## 2. TESTING

Conducting Health-Based Risk Assessments of Medical Materials  
Nancy Stark  
Standards and Guidances  
Method  
Hazard Identification  
Dose-Response Assessment  
Exposure Assessment  
Risk Characterization  
Nitinol Implant  
Wound-Dressing Formulation  
Perchloroethylene Solvent

Ligature Material  
Sources of Data  
Uncertainty Factors  
Safety Margins  
Conclusion  
Pharmaceutical  
Pharmaceutical Market Focuses on Cutting Costs, Not Value  
Some Segments Promising  
Regulatory Requirements  
Packaging Machinery  
Other Trends  
The Future

### 3. STERILIZATION

Traditional Processes  
New Processes  
Chemical Processes (Gas/Liquid)  
Peracetic Acid  
Hydrogen Peroxide  
Ozone  
Chlorine Dioxide  
Physicochemical Processes  
Plasmas  
Steam  
Synergetic Processes  
Psoralens and UVA (PUVA)  
Microwave and Bactericide  
Low-Temperature Steam and Formaldehyde  
Physical Processes  
Microwaves  
Pulsed-Light Systems  
Validation of Sterilizer Processes

### 4. HIGH PERFORMANCE PVC COMPOUNDS & TPE™S FOR MEDICAL APPLICATION

Long Term Contribution of PVC in Health Care  
Pvc™s Dominance in the Growing Market  
Challenges by Environmentalist to PVC  
Key Barriers to PVC Replacement  
The Major Factors Which Continue to Favour the Use of PVC are  
PVC Innovation  
ABC of Innovation  
Features of Hi-performance PVC Compounds  
The Use of Hi-performance PVC in Medical Devices  
TPE Based on Pvc Replaces Silicone  
TPE Based on PVC Outflexes Silicone Rubber

### 5. INNOVATIONS REMAKE PLASTIC INJECTION MOLDING

Useful Properties  
Parts on a Diet  
Equipment and Processes  
Automating for Success  
Conclusion

## 6. POLYVINYL CHLORIDE IN CRITICAL HEALTHCARE PRODUCTS

Factors Which Made Polyvinyl Chloride the Material of Choice for the Fabrication of Medical Devices

Typical Medical Applications of PVC

Choice of Plasticisers

Containers for the Collection and Storage of Blood and Blood Products

Storage of Platelets

Containers for Intravenous Fluids and for Parenteral Nutrition

Containers for Constant Ambulatory Peritoneal Dialysis Solutions (Capd Bags)

Containers for the Collection and Storage of Cord Blood

Reported Deleterious Effects of Dehp Plasticised PVC and the Present Position

Trends in the Development of Newer Materials

## 7. ADVANCES IN MEDICAL PLASTICS

Microtagging

Thermosets

Antithrombogenic Coatings

Dryfilm Lubricant

Curing Process for Synthetic Polyisoprene Latex

Topas Cyclic Olefin Copolymer

## 8. MEDICAL APPLICATIONS OF POLYCARBONATE

Processing

Sterilization

Typical Applications

Renal Dialysis

Cardiac Surgery Products

Surgical Instruments

IV Connection Components

Polycarbonate Developments for the Medical Market

Radiation Grades

High-Temperature Grades

Polycarbonate Blends

Enhanced-Productivity Grades for Cleanroom Molding

Lipid-Resistant Grades

Conclusion

## 9. RADIO-FREQUENCY SEALING FOR DISPOSABLE MEDICAL PRODUCTS

Steve Myers

What is RF Sealing?

How RF Works

Sizing RF Sealers

Tooling

Efficient RF Sealing Techniques

Maximum Throughput With Automation

Double-cycle Sealing

Comparing RF With Other Sealing Technologies

Conclusion

## 10. PET BOTTLES AND APET SHEET FOR BLISTER PACKING FOR PHARMA APPLICATION

Pet Conversion Processes

Pet – A Pure Polymer

Pet Bottles for Pharma

Filling Lines for Pet Bottles

Case Study for Use of Pet Bottles in Pharma Industry  
Conclusion  
Generic Drugs That Can Be Packed in Pet Bottles  
Ayurvedic Products That Can Be Packed In Pet  
Cost-Competitiveness of Pet Bottle for Pharma Industry  
Pet Bottles for Pharma Products – Useful Tips  
Apet Sheet – Material, Processing & Applications  
Apet Sheets – Total Consumption  
Apet Thin Sheet  
What is Apet Sheet  
Factors For Growing Interest in Apet Sheet  
Advantages of Apet Sheet  
Blister Packing  
Apet Sheet vs. PVC Sheet  
Apet Sheet vs. PP Sheet  
Gas/Moisture Barrier Properties Pet vs. Other Polymers  
Salient Points of Apet Thin Sheet  
Pet – Ecofriendly and Recyclable  
Pet Converters – Expectations of Pharmaceutical Industry  
Development Trials for Pharma Industry By RIL  
Other Applications of Apet Thin Sheet  
Conclusion

#### 11. BREATHABLE TPE FILMS FOR MEDICAL APPLICATIONS

Barrier Films  
Microclimate Dynamics  
TPE Resin Chemistry  
Soft Segments  
Hard Segments  
Film Manufacture  
Lamination  
Hot-Melt Screen Printing  
Melt Printing  
Porous Coating  
Spray Coating  
Medical Applications  
Conclusion

#### 12. THE CHANGING ROLE OF THE MEDICAL DEVICE CONTRACT MANUFACTURER

Growth, Growth & Growth  
Outsourcing and Consolidation  
Meeting the Challenge

#### 13. MEDICAL PACKAGING

Rising Demand Predicted  
Drug/Device Products Lead The Way  
Cost Considerations  
Test Methods  
Regulatory Picture  
Conclusion

#### 14. PERFORMANCE PROPERTIES OF METALLOCENE POLYETHYLENE, EVA, AND FLEXIBLE PVC FILMS

Experimental Procedure

Results

Conclusion

## 15. POLYURETHANE THIN-FILM WELDING FOR MEDICAL DEVICE APPLICATIONS

Weldability of Thermoplastics

Film-joining Methods

RF Welding

Ultrasonic Welding

Direct Thermal Sealing

Induction Welding

Solvent Bonding

Conclusion

## 16. POLYURETHANE FILM AS AN ALTERNATIVE TO PVC AND LATEX

PVC

Natural Rubber Latex (NRL)

Thermoplastic Polyurethanes

Concerns About PVC

## 17. GAS PERMEABILITY AND MEDICAL FILM PRODUCTS

Materials and Experimental Methodology

Results and Discussion

Conclusion

## 18. OPPORTUNITIES FOR PVC REPLACEMENT IN MEDICAL SOLUTION CONTAINERS

Ethylene-vinyl Acetate

Polyester

Polyolefin Blends

Polyolefin Laminates

Functionalized Polyolefins

Conclusion

## 19. PRODUCING BUBBLE/TAPER TUBING FOR MEDICAL APPLICATIONS

Extrusion-line Design

Forming Considerations

Cooling and Sizing

Pulling and Cutting Systems

Conclusion

## 20. THERMOPLASTIC SILICONE-URETHANE COPOLYMERS : A NEW CLASS OF BIOMEDICAL ELASTOMERS

Silicones

Thermoplastic Polyurethanes

Silicone-modified Polyurethanes

Silicone-urethane Copolymers

Conclusion

## 21. SELECTING MATERIALS FOR MEDICAL PRODUCTS : FROM PVC TO METALLOCENE POLYOLEFINS

Fundamental Considerations

Selecting Materials

Material Performance Versus Product Performance

PVC Versus Metallocenes  
Advantages of PVC  
Disadvantages of PVC  
Advantages of Metallocenes  
Potential Metallocene Disadvantages  
Challenges for Metallocene Materials  
Safety and Quality  
Product Design and Processing  
Product Performance  
Conclusion

## 22. COATING AND SURFACE TREATMENT TECHNOLOGIES

Ion-Beam Processingâ€”Spire Corp. (Bedford, MA).  
Light-Activated Surface Modificationâ€”BSI Corp. (Eden Prairie, MN).  
Plasma Surface Engineeringâ€”Talison Research (Sunnyvale, CA).  
Antimicrobial/Antibiotic Coatingsâ€”STS Biopolymers, Inc. (Henrietta, NY).  
Thromboresistant (Heparin) Coatingsâ€”Baxter Healthcare Corp. (Irvine, CA).

## 23. INJECTION MOLDING ENGINEERING PLASTICS

How It Works  
Balancing Variables  
Tool Design  
Design Aids  
Conclusion

## 24. GROWTH AND NEW CHALLENGES FOR DEVICE MARKET

Cost Concerns  
Steady Growth  
Regulatory Issues  
Technology Issues  
The Future

## 25. ASSESSING THE PERFORMANCE AND SUITABILITY OF PARYLENE COATING

Medical Coating Characteristics  
Medical Coating Applications  
Parylene Review  
Parylene N  
Parylene C  
Parylene D  
The Parylene Process  
Conclusion

## 26. PAPER OR PLASTIC? MEDICAL NONWOVEN COMBINES BEST PROPERTIES OF BOTH TAPES

Thin-Film Coater Improves Process Control  
Susan Wallace  
Chips Propel Advances in Medical Imaging Equipment  
Susan Wallace

## 27. PRODUCTS & SERVICES

Dispensing units  
Slot-die system  
Packaging system  
Tube cutter

Automation equipment  
Injection moulding machines  
Catheter processing equipment  
Benchtop moulder

## 28. REPROCESSING DISPOSABLE (SINGLE-USE) ITEMS

Background  
How Safe Is Reprocessing  
Benefits of Reprocessing  
Definitions  
Recycling  
Reprocessing  
Reprocessing Disposable (Single-use) Items  
Reprocessing Disposable Surgical Gloves  
Recycling or Reprocessing Disposable (Plastic) Syringes Andhypodermic Needles  
Recycling Disposable Syringes  
Reprocessing Disposable Syringes (and Needles)  
Reprocessing Versus Disposal of Needles and Syringes

## 29. PLASTICS MEDICAL DISPOSABLES & AMPULE TRAYS WITH G.N. PRESSURE-FORMING TECHNOLOGY

Introduction  
Ampule Package  
Current Technology  
Contact Heat, Cut-in-place, Pressure Thermoforming Technology  
Quality Control  
Flexibility  
Efficiency  
Simplicity  
Applications of Contact Heat, Cut-in-place, Pressure Thermoformers  
Design of Parts  
Material  
Production Volume  
Cost

## 30. PVC IN MEDICAL APPLICATION

Introduction  
Topic of Discussion  
Medical Application For PVC  
Benefits of PVC  
Safety  
Chemical Stability  
Biocompatibility  
Clarity & Transparency  
Flexibility, Durability & Dependability  
Sterilizability  
Compatibility  
Resistance to Chemical Stress Cracking  
Low Cost  
Additives Used for PVC Compounding  
Plasticisers  
Stabilisers  
PVC In Medical Products – An Environmental Perspective



Regulation and Product Standards  
Good Manufacturing Practice (GMP)  
Important Aspects Of GMP  
Plastic Processing in Clean Rooms  
I.V. Fluid Containers: Why PVC?  
Cost Effectiveness  
Reliability  
Simplicity in the Filling Process  
Safety in the Hospital  
Conclusion

## 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.

---

**NIIR PROJECT CONSULTANCY SERVICES** , 106-E, Kamla Nagar, New Delhi-110007, India. **Email:** [npcs.india@gmail.com](mailto:npcs.india@gmail.com) **Website:** [NIIR.org](http://NIIR.org)

Thu, 27 Jun 2019 06:29:34 +0530