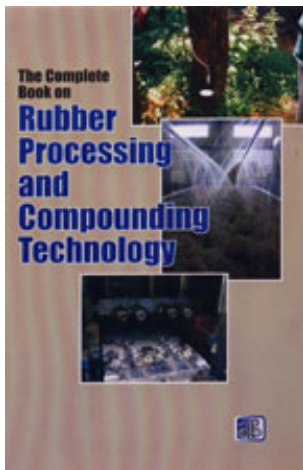


The Complete Book on Rubber Processing and Compounding Technology



Author: NIIR Board of Consultants and Engineers

Format: Paperback

ISBN: 8178330059

Code: NI174

Pages: 712

Price: Rs. 1,275.00 **US\$** 125.00

Publisher: Asia Pacific Business Press Inc.

Usually ships within **5** days

Rubber products industry is an important resource based industry sector in India. Over the last decade the rubber industry has witnessed a steady and strong growth. Rubber can be deformed to a high degree of strain in a reversible manner and this special property finds use in fields as diverse as transportation, material handling, health care, and sport and leisure activities. The book covers manufacturing processes of rubber products, compounding of rubber, quality assurance, applications etc. Thus book is very useful for new entrepreneurs, existing units, technical institutions, technocrats etc.

Contents

1 RUBBERS: MATERIALS AND PROCESSING TECHNOLOGY

Natural Rubber Plantation

Tapping of Rubber Latex

Preservation and Coagulation of Latex

Chemical Nature of Natural Rubber Hydrocarbon

Hydrogenated Rubber

Cyclized Rubber

Chlorinated Rubber

Rubbers from Stereo-regular Polymerization of Isoprene and Butadiene

Styrene-Butadiene Rubber (SBR)

Polychloroprene Rubber (CR)

Nitrile Rubber (NBR)

Butyl Rubber (IIR)

Ethylene-Propylene-Diene Terpolymer (EPDM)

Polysulphide Rubber (PSR)

Polyacrylic Rubber or Acrylate Rubber (ACR)

Fluorocarbon Rubber (FKM)

Introduction
Mastication and Mixing
Open Mill
Internal Mixers
Reclaimed Rubber
Fillers
Antidegradants
Accelerators
Retarders
Activators
Tyres
Belting and Hoses
Cellular Rubber Products
Miscellaneous Applications of Rubber
Passenger Tyre
Tube Compound for Car tyres
Conveyor Belts
Insulation Compound for Cables
Shoe Soles
2 MIXING TECHNOLOGY OF RUBBER
Two-roll Mills
Internal Batch Mixers
Continuous Mixers
Advantages of continuous mixing
Disadvantages of continuous mixing
Development of the Banbury Mixer
Operating Variables
Ram Pressure
Rotor Speed
Batch Size
Coolant Temperature
Unit Operations in Mixing
Single-Pass Versus Multiple-Pass Mixing
Types of Mix Cycle
Late Oil Addition
Upside-down Mixing
Sandwich Mixes
Analysis of Changes to the Mix Procedure
Acceleration of First-pass Compound
Mill Mixing of Speciality Compounds
Acceleration in Line with Internal Mixing
Testing of Raw Materials
Elastomers as Raw Materials
Fillers
Plasticisers and Process Oils
Small Ingredients
Control of Composition
Tracking the Mix Cycle
Compound Testing
Basic SPC Charting
Rheometer Data and its Meaning
Mixing Control Software
Peptisers in Natural Rubber

Effects of Temperature
Effects of Time
Effects of Use Level
Effects of Other Additives
Peptisers in SBR
Peptisers in Sulphur-containing Polymers
Additives to Increase Viscosity
Preventing Unwanted Chemical Reactions
Filler Treatments
Bin Storage Problems
Inspection of Banbury Mixers
Inspection at the Mezzanine Level
Side Cooling
Rotor Cooling
Rotors and Bearings
Rotor Bearing Lubrication
Dust Stops
Drop Door and Latch
Hydraulic System
Grease System
Dust Stop Lubrication
Drive Gears
Couplings
Inspection of the Banbury Platform
Ram and Cylinder
Heating Weight
Piston Rod
Weight Pin Assembly
Hopper Door
Air Line Filter
Hopper Operation
Mixer Maintenance and Lubrication
Each time the mixer is started
Once per shift
Once per day
Once per week
Once per month
Every six months
Anticipating Required Service
Dust Stop Maintenance
SSA Dust Stops
Assembly
Lapping
Running
Banbury Mixer — Hydraulic Dust Stops
Assembly
Run-in
Lapping
Production
Flushing
EPDM Expansion Joint Cover
Expansion Joint Intermediate Layer
Traffic Counter Treadle Cover

SBR/IR Belt Cover
EPDM Low Voltage Electrical Connector
Peroxide-cured Black-filled EPDM Compounds
EPDM Concrete Pipe Gasket
Injection-moulded NBR Gasket
CR/SBR Blend
Low Durometer CR/SBR Blend
Non-black CR for Injection Moulding
Hard Rubber Industrial Wheel
High Durometer NBR Masterbatch
NBR/PVC Cable Jacket
NBR/PVC/SBR Blend
Butyl Masterbatch
Butyl Masterbatch, Heat Interacted
Chlorobutyl/NR Blend
CSM CORD Jacket
Non-black Millable Urethane
Some Major Changes
Tempered Water
Power-controlled Mixing
Energy Conservation
Composition of EPDM Elastomers
Variables in EPM and EPDM Elastomers
Average Molecular Weight
Molecular Weight Distribution
Ethylene/Propylene Ratio
Type of Diene
Diene Level
How Processing Relates to Structure and Rheology
Practical Guidelines for Mixing EP Elastomers
Using Internal Mixers
Polymer Composition and Form
Filler/Oil Levels and Types
Cure Systems
Processing Aids
Mixing Process
Mixing Instructions
Fill Factor
Mixing Temperature
Machine Parameters
Ram Pressure
Coolant Temperature
Automation
Machine Condition
Downstream Processing Equipment
Using Two-roll Mills
Summary
Rework
Phase Mixing
Natural Rubber Viscosity Reduction
Measurement of Mixing Efficiency
Special Considerations
Raw Materials

Typical Formulations
Internal Mixing
Mill Mixing
Summary
Accounting Methods
Farrel Continuous Mixer
Operating Principles of the FCM
Commercial Applications for the FCM
Farrel Mixing Venting Extruder (MVX)
Designing the Rotor
Analysis of Dispersive Mixing
3 TECHNIQUES OF VULCANIZATION
Pressureless Vulcanization
Rubber Moulding
Factors of Moulding
Mouldin
Compression Moulding
Transfer Moulding
Injection Moulding
Helicure
Buffed Tread Crumb
Incineration and Pyrolysis of Tyres
Reclaimed Rubber
4 RUBBER VULCANIZATION
Physical Property Tests
Free Sulphur Determination
Solvent-swell Method
Mooney-Rivlin Equilibrium Modulus
Differential Scanning Calorimetry
Determination of Spring Constant
Sulphur Vulcanization
Peroxide Crosslinking
Resin Vulcanization
Electron Beam Vulcanization
Nitroso Compounds
Metal Oxides
5 RUBBER COMPOUNDING
General Compounding Principles
Tensile Strength
Tear Resistance
The Crescent Tear Test
The Hardness of Rubber
Set
Abrasion Resistance
Flex Cracking Resistance
Resilience
Heat Build-up
Temperature Resistance
Tyres
Retreading Materials
Conveyor Belting, Transmission Belting and Hose
Footwear
Rubber Roller

Medical Applications
'O' rings and Seals
Rubber Blends
Master Batches
Choice of Rubber
Fillers
Vulcanizing Agents
Peptizers
Accelerators
Activators
Anti-oxidants
Retarders
Softeners and Plasticizers
Rubber Crumb
Factice
Processing Aids
Special Purpose Additives
Unvulcanized compound properties
Vulcanized compound properties
6 RUBBER RECLAIMING
7 MANUFACTURE OF RUBBER PRODUCTS
Classification
Components
Tyre Building
Parts of a Conveyor Belt
Cover rubber
Manufacturing Process
Finished belt testing
PVC Belting
Steel Cord Belting
Design of Hoses
Hose Manufacture
Braided/spiralised hoses
Testing of Hose
Constructions
V-Belt Manufacture
Main Types of Power Transmission Belts
Preparation of Ingredients
Stability of Latex Compounds
Manufacture of Latex Products
Foaming and Gelling
Vulcanization
Classification and Terminology
Fabric Lined Water-proof Shoes
Canvas Shoes
Micro-cellular Soling
Manufacturing procedure
Types of Mountings
8 LATEX AND FOAM RUBBER
Selection of Raw Materials
Preparation of Raw Materials
Compounding and Design
Maturation

Processing and shaping
Dipped Goods
Latex Thread
Vulcanisation
Hot Air Cure
Hot Water Vulcanisation
Autoclave Vulcanisation
Radiation Vulcanisation
Ultrasonic Wave Curing
Testing of Rubber Products
Packing and Marketing
Conclusions and Recommendations

Manufacture of Latex Foam
Dunlop Process
Mechanism of Gelling
Compounding
Foaming and Gelling
Construction of Moulds
Curing
Washing
Drying
Finishing
Common Defects in Foam Making
Shrinkage
Foam Collapse
Setting
Complete Distortion of the Foam
Protein estimation protocol
Conclusion

9 SILICONE RUBBER

Electronics and Electrical Industries
Silicone Rubbers to Mimic Flesh
Silicone Polymers
Silicone Rubber Elastomers
Reinforcing Fillers
Semireinforcing or Extending Fillers
Additives
Curing Agents
Mixing
Freshening
Moulding
Extrusion
Calendering
Dispersion Coating of Fabric
Heavy-duty Hose
Bonding
Bonding Unvulcanised Silicone Rubber
Bonding Vulcanised Silicone Rubber
Post-baking
Condensation Cure—One-component
Condensation Cure—Two-component
Addition Cure

10 POLYBUTADIENE AND POLYISOPRENE

Polyisoprene

Cyclopolyisoprene

Gel and Branching

Polybutadiene

Isoprene

Butadiene

11 STYRENE BUTADIENE RUBBER (SBR)

Raw Materials

Production of Hydrocarbon Rubber

Manufacture of Emulsion SBR

Vinyl Content and Blockiness

Molecular Weight and Branching

Manufacture of Solution SBR

Property Control

Branching

Blending

Properties

T_g Measurement

Molecular-weight Measurement

Dynamic Mechanical Measurements

Applications of SBR

12 RECLAIMED RUBBER

Whole Tyre Reclaim

Drab and Coloured Reclaims

Butyl Reclaim

Scrap-rubber Preparation

Reclaimed Rubber

Digester Process

Reclaimator Process

Pan Process

Engelke Process

Testing and Evaluations of Reclaimed Rubber

Millroom Operations

Special Strengths Through Reclaiming

Further Advantages of Reclaiming - Applications

Major Uses of Reclaimed Rubber

Automobile floor mat

Semi-pneumatic tyre

Butyl inner tube

Innerliner

Carcass

Applications

Process

Characterisation of Reclaimed Waste Latex Rubber (WLR)

13 NITRILE AND POLYACRYLIC RUBBER

Uses of Nitrile Rubber

Mixing and Processing

Latest Developments

Composition

Raw Polymer Characteristics

Physical Characteristics

Heat, Fluid, Low-temperature Resistance
Applications
Cure Systems
Reinforcing Agents
Plasticisers
Process Aids
Antioxidants
Mixing
Extrusion/Calendering
Compound Storage Stability
Vulcanisation
Bonding Characteristics
Solution Characteristics
Blends
Future Developments
14 RUBBER NATURAL
Agriculture
Exploitation
Latex Composition
Types and Grades
Production
Latex Concentrate
Processing
Chemistry
Physical Properties
Economic Aspects
Applications
15 HARD RUBBER
Ebonite
Hard Resin Rubbers
16 RECYCLING OF RUBBERS
Reclaiming Technology
Surface Treatment
Grinding and Pulverization Technology
Microwave Method
Ultrasonic Method
General Remarks
Use in New Tires
Rubber/Recycled Rubber Blends
Thermoplastic-Recycled Rubber Blend
E. Concrete Modified by Recycled Rubber
Asphalt Modified by Recycled Rubber
Use of Crumb Rubber in Soil

About NIIR

NIIR Project Consultancy Services (NPCS) is a reliable name in the industrial world for offering integrated technical consultancy services. Its various services are: Pre-feasibility study, New Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Preparation of Project Profiles and Pre-Investment and Pre-Feasibility Studies, Market Surveys and Studies, Preparation of

Techno-Economic Feasibility Reports, Identification and Selection of Plant and Machinery, Manufacturing Process and or Equipment required, General Guidance, Technical and Commercial Counseling for setting up new industrial projects and industry.

NPCS also publishes various technology books, directory, databases, detailed project reports, market survey reports on various industries and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by Indian and overseas professionals including project engineers, information services bureau, consultants and 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 **Website:** NIIR.org

Fri, 19 Mar 2010 04:35:53 -0400