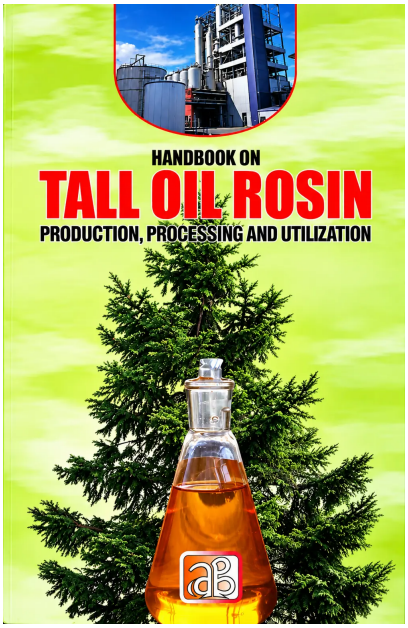
## Entrepreneur India

106-E, Kamla Nagar, New Delhi-110007, India.
Tel: 91-11-23843955, +91 9097075054
Mobile: +91-9097075054
Email: npcs.ei@gmail.com, info@entrepreneurindia.co
Website: www.entrepreneurIndia.co


# Handbook on Tall Oil Rosin Production, Processing and Utilization

| | |
|---|---|
| **Code** | NI247 |
| **Format** | paperback |
| **Indian Price** | ₹1575 |
| **US Price** | $150 |
| **Pages** | 480 |
| **ISBN** | 9788178331515 |

| | |
|---|---|
| **Publisher** | Asia Pacific Business Press Inc. |

## Description

Tall oil, a by-product of kraft pulping of pine wood, is formed by acidifying black liquor soap skimmings. It consists of resin acids or rosin, fatty acids, and neutrals. Crude tall oil is an excellent source of rosin and tall oil fatty acid, an industrial-grade oleic and linoleic acid blend. The bulk of the neutrals, largely esters of fatty acids, sterols, resin and wax alcohols, and hydrocarbons, boil at either lower or higher temperatures than the boiling range of the fatty and resin acids.
Tall oil itself has a variety of uses in industry. It is used as a frothing agent in the flotation process for reclaiming low grade copper- lead- and zinc-bearing ores, and as a solvent or wetting agent in a variety of textile and synthetic fibre manufacturing processes. The distilled fatty acids are used in soaps, detergents and disinfectants and as a base for lubricating greases, textile oils, cutting oils and metal polishes. They are also used as drying agents in paint, although synthetic substances are widely used. The fatty acids are unsaturated and on exposure to air undergo autoxidation and polymerization to form resin-like materials which form a tough protective coating. Resin acids are used in rubber polymerization and compounding, as size to impart water resistance to paper, and in adhesives and printing inks. Resin acids are the major component of a substance known as rosin, which is used by musicians to improve the grip of bows used for string instruments.
The book contains production details of different products like recovery of crude tall oil, Composition and properties of crude tall oil, Lab. Scale fractional vacuum distillation, tall oil soap acidulation, purification of sulphate soap, hydrodynamic separation of CTO, dimerization of tall oil fatty acid, black liquor soap recovery methods, tall oil in asphalt products and petroleum uses, tall oil in liquid soaps, tall oil in rubber, paper and printing inks etc. This book is very useful for scientists, scholars, consultants and technical institutions.

## Content

1. INTRODUCTION
Introduction to Tall Oil
History of Tall Oil
Production Process for Tall Oil
Recovery of Tall Oil
Composition and Properties of Tall Oil
Crude Tall Oil
Analysis and Testing of Tall Oil Products

Applications of Tall Oil
2. RECOVERY OF TALL OIL
The Chemistry of Tall Oil Fatty and Rosin Acids
Chemical Composition of Tall Oil Fatty Acids
General Reactions of Tall Oil Fatty Acids
Reactions Involving the Carboxyl Group
Chemical Composition of Tall Oil Rosin
Dimer Acids Manufacture and Feedstock
3. COMPOSITION AND PROPERTIES OF CRUDE
TALL OIL
Tall Oil Production and Laboratory Analyses at the Factories
Studies on the Precursors of Indian Tall Oil
Analytical Studies on the Composition of Crude Tall Oil
Experimental
Testing of Tall Oil with Standard Methods
Fractionation of Samples
Crude Tall Oil Recovery from Sulfate Soap
Separation of Free Acids and Neutrals
Preferential Esterification
Saponification
Methylation and Silylation
Thin-Layer Chromatography (TLC)
Preparative Argentation TLC
Gas Chromatography (GC)
Gas Chromatography—Mass Spectrometry (GC-MS)
Results and Discussion
Testing of Tall Oil with Standard Methods
Group Fractionations
Studies on the Composition and Component Distribution
Fatty Acids
Saturated Fatty Acids
Monoenoic Fatty Acids
Dienoic Fatty Acids
Trienoic Fatty Acids
Tetraenoic Fatty Acids
Conjugated Fatty Acids
Esterified Acids
Resin Acids
Neutral Components
Gr. 1 Phytosterols
Gr. 2 Monoterpene alcohols

Diterpene Abietic and Pimaric Type Alcohols
Fatty Alcohols
Triterpene Alcohols
Gr. 3
Gr. 4
Gr. 5
Gr. 6 Oxosteroids
Gr. 7 Dimethoxy Stilbenes
Gr. 8 Resin Acid Methyl Esters
Gr 9 Diterpene Aldehydes
Gr. 10 Esters of Fatty Acids with Diterpene Alcohols
Gr. 11 Esters of Fatty Acids with Fatty Alcohols
Gr. 12 Esters of Fatty Acids with Sterols and Triterpene Alcohols
Gr. 13 Hydrocarbons
Sesquiterpene Hydrocarbons
Diterpene Hydrocarbons
Typical Features of Indian Tall OIl
General Properties
Component Distribution
Factors Influencing the Properties ond Composition of Crude Tall Oil
Wood Species
Geographical Location (Climate)
Roundwood and Chip Storage
Other Factors
4. CHEMICAL CHANGES DURING STORAGE OF
CRUDE TALL OIL
Experimental
Results and Discussion
Drop in Acid Number
Esterification
Thermal and Acid Isomerization of Resin Acids
General
Results from Laboratory Storage
Crystallization
Changes in the Composition of Conjugated Fatty Acids
Aspects of the Storage of Turkish Crude Tall Oil
5. LABORATORY-SCALE FRACTIONAL VACUUM
DISTILLATION
Experimental
Still
Charges

Procedure
Analytical Procedures
Results and Discussion
Composition of the Distillates
Distribution of Tall Oil Constituents in the Distillates
Fatty Acids
Esterified Acids
Resin Acids
Neutrals
Sesquiterpene Hydrocarbons
Diterpene Hydrocarbons
Hydrocarbons from Decarboxylation of Resin Acids
Diterpene Aldehydes
Pinosylvin Dimethyl Ether
Diterpene Alcohols
Resin Acid Methyl Esters
Fatty Alcohols
Dehydrated Sterols
Sterols
Triterpene Alcohols
Esters
Unidentified Components
Composition of the Pitches
Components Not Eluted on GC
Volatilities of Tall Oil Constituents with Special Reference to Fatty and Resin Acids
General
Observations on the Laboratory Distillation
Brief Critique on the Laboratory Distillation
Conclusions
6. OZONOLYSIS AND EPOXIDATION OF METHYL MALEOPIMARATE
Results and Discussion
Ozonolysis and Epoxidation of Methyl Maleopimarate (lb) and Other Related Compounds
Structural Assignment to 4a
Absolute Configuration of 4b
Structure of the Anhydride 6
Structure of the Epoxy Anhydride 5
Reaction of Peroxytrifluoroacetic with Bicyclo[2.2.2]oct-5-ene-endo-cis-2.3-dicarboxylic Anhydride (8)
Structural Assignment to 9

Structure of the Hydroxy Lactone 10
Experimental
Ozonolysis of Methyl Maleopinarate (lb). Isolation of 4b, 5, and 6
Preparation of the Tetramethyl Ester of 6
Preparation of 5 by Direct Epoxidation of lb
Preparation of 20
Reaction of 21 with Peroxytrifluoroacetic Acid. Preparation of 22
Reaction of Peroxvtrifluoroacetic Acid with Olefin 8. Preparation of 5,6-Endo-epoxy-bicyclo[2.2.2]octane-cis-2,3-dicarboxylie Anydride 9
Epoxidation of Olefin 8 with m-Chloroperbenzoic Acid. Preparation of Hydroxy Lactone 10
Preparation of 35 and 36 from 10
Preparation of 37 and 38
Preparation of Bromo Lactonic Acid 39 from the Olefinic Anhydride 8
Preparation of the Bromohydrin 41 of Dimethyl Ester 37
Preparation of 40, the C2 Epimer of 39
Discussion of Results
The Benzogulnone Adduct of Levopimaric Acid (XXVIII)
The Dimethyl Acetylenedlcarboxylate Adduct of Levopinaric Acid
Other Adducts of Levoplmarlc Acid
7. TALL OIL SOAP ACIDULATION
Batch Process
Semi-Batch Process
Continuous Decanting Process
Centrifuge Process
8. RETROFITTING A TALL OIL ACIDULATION
PLANT
9. PURIFICATION OF SULPHATE SOAP
10. HYDRODYNAMIC SEPARATION OF CTO
11. REFINING OF TALL OIL BY COLUMN LIQUID-
LIQUID EXTRACTION
Introduction
The Pilot Plant at the Technical Research Centre of Finland
Trials with Mixed Pine-Birch Soap
Trials with Other Tall Oil Products
Conclusions
12. DIMERIZATION OF TALL OIL FATTY ACID
13. TALL OIL SOAP ACIDULATION AND SULFUR
BALANCE PROBLEMS IN KRAFT MILLS
Soap Acidulation
Spent Acid Disposal

Sulfur Losses
Soda Losses
Sulfur Balance
Replace H2SO4 with DGE
Sewering DGE
Modified C102 Production Technology
Concluding Remarks
14. BLACK LIQUOR SOAP RECOVERY METHODS
Woodstorage
Digestion and Washing
Soap Recovery in the Weak Liquor System
Soak Skimmer Design and Operation
Air Injection to Improve Recovery
Influence of Hardwood Liquor on Soap Recovery
Heavy Liquor Soap Recovery
Soap Decanter Design and Operation
Monitoring Soap Recovery Efficiency
Summary
15. CONTROLLING POLLUTION IN A LUWA TALL OIL DISTILLATION PLANT
Sources of Effluents from CTO Facilities
Processes for the Distillation of Crude Tall Oil
The Luwa CTO Distillation Process
Effluents from the Luwa CTO Distillation Process
Minimizing Effluents in CTO Distillation Plants
16. ADVANCED POLLUTION CONTROL TECHNOLOGY IN THE STEAM DISTILLATION OF TALL OIL
Corrosion & Materials of Construction
Reboiler Design
Tower Internals
Stability
Conclusion
17. NEW SEPARATION TECHNOLOGY FOR DISTILLED TALL OIL
Introduction
Sorbex Process Outline
Simulated Moving Bed
Experimental Results
Conclusions
18. CARBON DIOXIDE PROCESS
Introduction

Discussion
19. FINNISH EXPERIENCE IN TALL OIL PITCH AS
ASPHALT SUBSTITUTE
Background
Tall Oil Pitch - Renewable Natural Resource
Pitches in Asphalt and Pavement Characteristics
Mixing and Laying of the Pavements in Field Experiments
Wear Tests in Laboratory and On Field Show Improved Tendency
Asphalt Paving Contracts in 1988
Prejudices Disappear -The Future Is Open
20. USES OF TALL OIL
Tall Oil Products in Surface Coatings
Tall Oil in Alkyd Resins
Tall Oil Formulations in Alkyd Resins
Short Oil Baking Alkyd - Solvent Process
Properties
Short Oil Baking Alkyd - Fusion Process
Medium Oil Alkyd-Fusion Process
Long Oil Alkyd - Fusion Process
Rosin Modified Allkyd-Fusion Process
Glycerine Ester
Maleic Modified Ester
Distilled Tall Oil Epoxy Ester
Other Uses for Tall Oil Products
Tall Oil in the Plasticizer Field
Tall Oil Plasticizers
Esterification of Tall Oil for Plasticizers
Tall Oil in Adhesives and Linoleum Cement
Tall Oil in Rubber Based Adhesives
Tall Oil in Hot-Melt Adhesives
Tall Oil Products in Linoleum Cements
21. TALL OIL IN ASPHALT PRODUCTS AND
PETROLEUM USES
Tall Oil in Asphalt
Roads
Soil Treatments
Roofing
Adhesives
Antistripping Agents
Plasticizers
Miscellaneous

Tall Oil in Petroleum Applications
Oil and Gas Well Fracturing
Drilling Muds
Demulsification Agents
Corrosion Inhibitors
Catalyst
Lubricating Oil Additives
22. TALL OIL IN LIQUID SOAPS
Tall Oil in Disinfectants
Tall Oil in Synthetic Detergents and Wetting Agents
Syndet Types
Syndet Products
Tall Oil in Biodegradable Detergents
23. TALL OIL IN FLOTATION COLLECTORS AND
CORE OILS
Tall Oil in Flotation Collectors
Flotation Collectors
Flotation Applications
Tall Oil in Core Oils
24. TALL OIL IN RUBBER
Styrene-Butadiene Rubber
Cold SBR Formulation (SBR 1500 Series)
Hot SBR Formulation (SBR 1000 Series)
Cold High Solids SBR 2105 Latex Formulation (SBR 2100 Series)
Hot SBR Latex Formulation (SBR 2000 Series Type II)
Foam Rubber
25. TALL OIL IN PAPER SIZE
Papermaking Process
Rosin Sizing Materials
Forms of Size Available
Paste Size
Dry Size
Methods of Preparing Liquid Size
Cooking Process
Emulsion Process
Bewoid Process
Delthirna Process
Internal and External Sizing
Effect of Wet Strength Resins and Paper Coating Resins on Sizing
Sizing of Nonconventional Paper
Testing of Sizing

Water Resistance of Paper and Paperboard—T433 M-44 (Dry Indicator Method)
Water Immersion Test of Paperboard—T491 SU-63
Water Absorption of Paperboard—T492 SM-60
Water Absorptiveness of Nonbibulous Paper and Paperboard— T441M-60 (Cobb Test)
Degree of Curl and Sizing of Paper—T466 M-52
Ink Penetration Test
Fotosize Penetration Test—Lactic Acid Test
26. TALL OIL IN PRINTING INK
Typographic Printing and Typographic Inks
Heat-Set Inks
Steam-Set Inks
Newsprint Inks
Lithographic Printing and Lithographic Inks
Intaglio or Gravure Printing and Gravure Inks
Silk-Screen Printing Inks
Overprint Varnishes
Bag Inks
27. MISCELLANEOUS APPLICATIONS OF TALL OIL
Tall Oil Fatty Acids for Chemical Intermediates
Polymerized Fatty Acids
Azelaic and Pelargonic Acids
Tall Oil in Coprecipitated Barium Salts
Tall Oil in Defoamers
TALL OIL IN PIGMENT DISPERSANTS

## 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, directories, 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 bureaus, consultants and consultancy firms as one of

the inputs in their research.