

# **Petroleum & Petroleum Products Technology Handbook (Thermal Cracking of Pure Saturated Hydrocarbons, Petroleum Asphalts, Refinery Products, Blending and Compounding, Oil Refining and Residual Fuel Oils)**

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

**Format:** Paperback

**ISBN:** 9788193733912

**Code:** NI528

**Pages:** 440

**Price:** Rs. 1,875.00 **US\$** 50.67

**Publisher:** NIIR PROJECT CONSULTANCY SERVICES

Usually ships within **5** days

Petroleum asphalt is a sticky, black and highly viscous liquid or semi-solid that is present in most petroleum crude oils and in some natural deposits. Petroleum crude oil is a complex mixture of a great many different hydrocarbons. Refined petroleum products are derived from crude oils through processes such as catalytic cracking and fractional distillation. Refining is a necessary step before oil can be burned as fuel or used to create end products.

Residual fuel oil is a complex mixture of hydrocarbons prepared by blending a residuum component with a flux stock which is a distillate component diluent, to give the desired viscosity of the fuel oil produced. Petroleum refining is the process of separating the many compounds present in crude petroleum. An oil refinery or petroleum refinery is an industrial process plant where crude oil is processed and refined into more useful products.

The global Petroleum Asphalt market is valued at USD 48.8 Billion in 2017 and is expected to reach USD 77.67 Billion by the end of 2024, growing at a Growth Rate of 6.87% between 2017 and 2024. The global bunker fuel market was valued at \$137,215.5 million in 2017 and is expected to reach \$273,050.4 million by 2025, registering a CAGR of 9.4% from 2018 to 2025.

Some of the fundamentals of the book are composition of radiation effects on lubricants, thermal cracking of pure saturated hydrocarbons, petroleum asphalts, refinery products, refinery feedstocks, blending and compounding, oil refining, residual fuel oils, distillate heating oils, formulations of petroleum, photographs of machinery with suppliers contact details.

A total guide to manufacturing and entrepreneurial success in one of today's most lucrative petroleum industry. This book is one-stop guide to one of the fastest growing sectors of the petroleum industry, where opportunities abound for manufacturers, retailers, and entrepreneurs. This is the only complete handbook on the commercial production of petroleum products. It serves up a feast of how-to information, from concept to purchasing equipment.

## **Contents**

## 1. RADIATION EFFECTS ON LUBRICANTS

Introduction

Interaction of Radiation with Organic Matter

General Physical Effects of Radiolysis

Base Oils

The Radiation Environment

Hydrocarbons (Petroleum Oils)

Alkylaromatics

Ethers

Esters

Silicones

Halogenated Compounds

Additives

Radiation Damage Inhibitors

Antioxidants

Viscosity Index Improvers

Antiwear Additives

Extreme Pressure (EP) Agents

Foam Inhibitors

Rust Inhibitors

Environmental Factors

Effects of Radiation Type and Intensity

Role of Temperature

Influence of Oxygen

Oil Lubricants

General: Commercial formulations

Based on Alkylaromatic Fluids

Fluids Based on Poly (phenyl ethers)

Steam Turbine Oils

Aircraft Turbine Oils

Hydraulic Fluids

Lubricating Greases

Gelling Agents

CONTENTS

Base Oils

Commercial Greases

Greases of Enhanced Radiation Resistance

Dynamic Tests

Principles

## 2. THERMAL CRACKING OF PURE SATURATED HYDROCARBONS 65-102

Introduction

Experimental Methods

Batch Reactors

Flow Reactors

Residence Time

Volume Change on Reaction

Kinetics of the Cracking Process

Rates of Decomposition

Straight Chain Paraffins

Correlation of the Rate Constants for n-Paraffins

Effect of Branching on the Rate of Decomposition

Effect of Pressure on the Decomposition of Paraffinic  
Hydrocarbons

Rates of Decomposition—Saturated Cyclic Hydrocarbons

Estimation of Rate Constant of Decomposition

#### APPENDIX

Calculation of Product Distribution from Paraffin Cracking by the Rice-Kossiakoff Method.

### 3. PETROLEUM ASPHALTS

Chemical and Physical Composition

Possible Structures of the Nuclei in Resins and Asphaltenes

Manufacture of Asphalt from Petroleum

uses of Asphalts

### 4. REFINERY PRODUCTS

Low-boiling Products

Gasoline

Gasoline Specifications

Distillate Fuels

Jet and Turbine Fuels

Automotive Diesel Fuels

Railroad Diesel Fuels

Heating Oils

Residual Fuel Oils

### 5. REFINERY FEEDSTOCKS

Crude Oil Properties

1. API Gravity

2. Sulfur Content, Wt%

3. Pour Point, °F (°C)

4. Carbon Residue, Wt%

5. Salt Content, 1lb/1000 bbl

6. Characterization Factors

7. Nitrogen Content, Wt%

8. Distillation Range

9. Metals Content, ppm

10. Total Acid Number

Composition of Petroleum

1. Paraffins

2. Olefins

3. Naphthenes (Cycloparaffins)

4. Aromatics

Crudes Suitable for Asphalt Manufacture

Crude Distillation Curves

Problems

### 6. BLENDING AND COMPOUNDING

### 7. OIL REFINING

Introduction

General Aspects of Oil Refining

Crude Oils and Products

Crude Oil Constituents

Classification of Crude Oils

Oil Products  
1. Gas Fuels  
2. Liquid Fuels  
Nonfuel Applications  
Oil Refining Processes  
Crude Oil Distillation  
Atmospheric Distillation  
Vacuum Distillation  
Crude Oil Desalting  
Catalytic Cracking (Cat Cracking)  
Hydrotreating  
Distillate Hydrotreating  
Pyrolysis Gasoline Hydrotreating  
Desulfurizing by Adsorption  
Catalytic Reforming  
Introduction  
Semiregenerative Reformer  
Fully Regenerative Reformer  
Continuously Regenerative Reformer  
Hydrocracking  
Residue Conversion Process Introduction  
Fundamentals of Residue Conversion and Process Options  
Hydrogen Addition (“H-in”) Processes  
Residue Hydrotreating (Demetallization, Desulfurization, Denitrification)  
Residue Hydrocracking (Hydroconversion)  
Carbon Rejection (“C-out”) Processes  
Thermal Processes (Visbreaking, Coking)  
Catalytic Processes (Residue Cat Cracking)  
Other Processes  
Extraction of Asphaltenes  
Partial Oxidation  
Process Combinations  
Gasoline Upgrading Processes  
1. Alkylation  
2. Polymerization  
3. Isomerization  
4. Production of Ethers (MTBE, ETBE)  
Other Processes  
Gas Treating  
Sulfur Recovery  
Catalysts  
Environmental Protection in Oil Refining  
Introduction  
Manufacturing Emissions  
Hydrocarbons  
Hydrocarbons in Air  
Hydrocarbons in Wastewater  
Hydrocarbons in Soil and Groundwater  
Sulfur and Nitrogen Compounds  
Sulfur Compounds  
Nitrogen Compounds  
Consumer Related Emissions

Transportation Fuels  
Motor Gasoline  
Diesel Fuel  
Marine Fuels  
Fuels for Heat Generation  
Cost of Environmental Conservation  
Integrated Refinery Models  
Trends of Refinery Structures  
Hydroskimming Refinery  
Conversion Concepts  
Cat Cracking – Visbreaking Refinery  
Hydrocracking- Cat Cracking Refinery  
Hydrocracking – Coking Refinery  
Integration of Existing Refineries  
Corrosion and Materials  
Testing and Analysis  
Crude Oil and Product Properties  
Testing Methods and Standards  
Storage and Transport

## 8. RESIDUAL FUEL OILS

History  
Specifications For Residual Fuels  
Fluidity  
Thermal Stability  
Explosiveness  
Pacific Specifications for Fuel Oils  
Detailed Inspections of Heavy Fuels  
End uses of Residual Fuel Oils  
Steam Boilers  
Industrial Applications  
Diesel Engines  
Gas Turbines  
Gas-enrichment Oils  
Problems Associated with Utilization  
Sulfur in Residual Fuel Oils  
Ash Possible Source of Contaminants  
Soot and Carbon Particles  
Instability and Incompatibility  
The Combustion of Residual Fuels  
Heating Value  
Chemistry of Combustion  
Flue-gas Analysis  
Humidity in Air and Flue Gases  
Heat Content of Flue Gases  
Specific Heat of Fuel Oils  
Residual Fuel Oil Burners

## 9. DISTILLATE HEATING OILS

Status of the Heating-Oil Industry  
Burners, Controls and Tanks  
Central-Heating Systems  
Burning Qualities in Oils

Stability in Heating Oils  
Handling and Delivery  
10. FORMULATIONS OF PETROLEUM

11. PHOTOGRAPHS OF MACHINERY WITH SUPPLIERS CONTACT DETAILS

## 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](mailto:npcs.india@gmail.com) **Website:** [NIIR.org](http://NIIR.org)

Sun, 28 Apr 2024 04:27:19 +0530