

# Contents

Preface—George E. Totten, Rajesh J. Shah, and Steven R. Westbrook ix

## **I. PETROLEUM REFINING PROCESSES FOR FUELS AND LUBRICANT BASESTOCKS—*Rajesh J. Shah, Section Editor***

**Chapter 1—Petroleum Oil Refining** 3  
*Marvin S. Rakow*

## **II. FUELS: PROPERTIES AND PERFORMANCE— *Steven R. Westbrook, Section Editor***

**Chapter 2—Liquefied Petroleum Gas** 31  
*Robert J. Falkiner*

**Chapter 3—Motor Gasoline** 61  
*B. Hamilton and Robert J. Falkiner*

**Chapter 4—Aviation Fuels** 89  
*Kurt H. Strauss*

**Chapter 5—Automotive Diesel and Non-Aviation Gas Turbine Fuels** 115  
*Steven R. Westbrook and Richard Le Cren*

**Chapter 6—Introduction to Marine Petroleum Fuels** 145  
*Matthew F. Winkler*

## **III. HYDROCARBONS AND SYNTHETIC LUBRICANTS: PROPERTIES AND PERFORMANCE—*Rajesh J. Shah, Section Editor***

**Chapter 7—Hydrocarbon Base Oil Chemistry** 169  
*Arthur J. Stipanovic*

**Chapter 8—Hydrocarbons for Chemical and Specialty Uses** 185  
*Dennis W. Brunett, George E. Totten, and Paul M. Matlock*

**Chapter 9—Additives and Additive Chemistry** 199  
*Syed Q. A. Rizvi*

**Chapter 10—Synthetic Lubricants: Nonaqueous** 249  
*Thomas F. Buenemann, Steve Boyde, Steve Randles,  
and Ian Thompson*

**Chapter 11—Environmentally Friendly Oils** 267  
*Hubertus Murrenhoff and Andreas Rimmelman*

**Chapter 12—Turbine Lubricating Oils and Hydraulic Fluids** 297  
*W. David Phillips*

<b>Chapter 13—Hydraulic Fluids</b>	<b>353</b>
<i>Willie A. Givens and Paul W. Michael</i>	
<b>Chapter 14—Compressor Lubricants</b>	<b>383</b>
<i>Glenn M. Webster, Desh Garg, and George E. Totten</i>	
<b>Chapter 15—Refrigeration Lubricants—Properties and Applications</b>	<b>413</b>
<i>H. Harvey Michels and Tobias H. Sienel</i>	
<b>Chapter 16—Gear Lubricants</b>	<b>431</b>
<i>Vasudevan Bala</i>	
<b>Chapter 17—Automotive Lubricants</b>	<b>465</b>
<i>Shirley E. Schwartz, Simon C. Tung, and Michael L. McMillan</i>	
<b>Chapter 18—Metalworking and Machining Fluids</b>	<b>497</b>
<i>Syed Q. A. Rizvi</i>	
<b>Chapter 19—Petroleum Waxes</b>	<b>525</b>
<i>G. Ali Mansoori, H. Lindsey Barnes, and Glenn M. Webster</i>	
<b>Chapter 20—Lubricating Greases</b>	<b>557</b>
<i>Thomas M. Verdura, Glen Brunette, and Rajesh Shah</i>	
<b>Chapter 21—Mineral Oil Heat Transfer Fluids</b>	<b>573</b>
<i>John Fuhr, Jim Oetinger, George E. Totten, and Glenn M. Webster</i>	
<b>Chapter 22—Non-Lubricating Process Fluids: Steel Quenching Technology</b>	<b>587</b>
<i>Bozidar Liscic, Hans M. Tensi, George E. Totten, and Glenn M. Webster</i>	
<b>IV. PERFORMANCE/PROPERTY TESTING PROCEDURES—</b>	
<i>Steven R. Westbrook and Rajesh J. Shah, Section Editors</i>	
<b>Chapter 23—Static Petroleum Measurement</b>	<b>635</b>
<i>Lee Oppenheim</i>	
<b>Chapter 24—Hydrocarbon Analysis</b>	<b>649</b>
<i>James C. Fitch and Mark Barnes</i>	
<b>Chapter 25—Volatility</b>	<b>675</b>
<i>Rey G. Montemayor</i>	
<b>Chapter 26—Elemental Analysis</b>	<b>707</b>
<i>R. Kishore Nadkarni</i>	
<b>Chapter 27—Diesel Fuel Combustion Characteristics</b>	<b>717</b>
<i>Thomas W. Ryan III</i>	
<b>Chapter 28—Engineering Sciences of Aerospace Fuels</b>	<b>729</b>
<i>Eric M. Goodger</i>	
<b>Chapter 29—Properties of Fuels, Petroleum Pitch, Petroleum Coke, and Carbon Materials</b>	<b>757</b>
<i>Semih Eser and John M. Andrésen</i>	

<b>Chapter 30—Oxidation of Lubricants and Fuels</b>	<b>787</b>
<i>Gerald J. Cochran and Syed Q. A. Rizvi</i>	
<b>Chapter 31—Corrosion</b>	<b>825</b>
<i>Maureen E. Hunter and Robert F. Baker</i>	
<b>Chapter 32—Flow Properties and Shear Stability</b>	<b>833</b>
<i>Robert E. Manning and M. Richard Hoover</i>	
<b>Chapter 33—Cold Flow Properties</b>	<b>879</b>
<i>Robert E. Manning and M. Richard Hoover</i>	
<b>Chapter 34—Environmental Characteristics of Fuels and Lubricants</b>	<b>885</b>
<i>Mark L. Hinman</i>	
<b>Chapter 35—Lubrication and Tribology Fundamentals</b>	<b>909</b>
<i>Hong Liang, George E. Totten, and Glenn M. Webster</i>	
<b>Chapter 36—Bench Test Modeling</b>	<b>963</b>
<i>Lavern D. Wedeven</i>	
<b>Chapter 37—Lubricant Friction and Wear Testing</b>	<b>1017</b>
<i>Michael Anderson and Frederick E. Schmidt</i>	
<b>Chapter 38—Statistical Quality Assurance of Measurement Processes for Petroleum and Petroleum Products</b>	<b>1043</b>
<i>Alex T. C. Lau</i>	
<b>Index</b>	<b>1061</b>