

A Comprehensive Review of
**Lubricant Chemistry,
Technology,
Selection,
and Design**

Syed Q. A. Rizvi



A Comprehensive Review of Lubricant Chemistry, Technology, Selection, and Design

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Preface

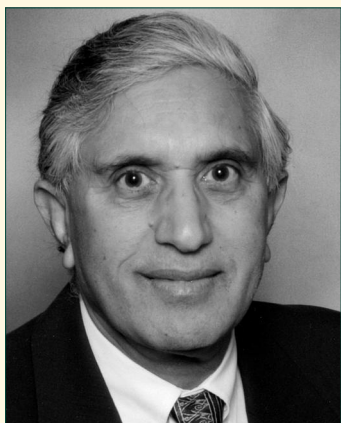
This book provides an overview of the technology of lubricants and its use in devising new ones. During my research, I found lubricant literature, both academic and commercial, to be rich with respect to information, with the Worldwide Web being an excellent source. The monographs pertaining to lubricant technology and tribology that I found most useful are listed below.

1. **Motor Oils and Engine Lubrication** by Alphonse Schilling, published by Scientific Publications, Great Britain, 1968.
2. **Lubricants and Related Properties**—Synthesis, Properties, Applications, International Standards, authored by Professor Dieter Klamann, published by Verlag Chemie, Hamburg, 1984.
3. **Chemistry and Technology of Lubricants**, Edited by R. M. Mortier and S. T. Orszulik, published by VCH Publishers, Inc. (Blackie), New York, 1992.
4. **Automotive Lubricants Reference Handbook** by Arthur Caines and Roger Haycock, published by SAE International, 1996.
5. **Lubricant Additives: Chemistry and Applications**, Leslie R. Rudnick, Ed., Marcel Dekker, Inc., New York, 2003.
6. **Fuels and Lubricants Handbook: Technology, Properties, and Testing**, George E. Totten, Ed., ASTM International, Philadelphia, 2003.
7. **CRC Handbook of Lubrication, Vol. I, Theory and Practice of Tribology: Applications and Maintenance**, Richard E. Booser, Ed., CRC Press, Boca Raton, 1983; **CRC Handbook of Lubrication, Theory and Practice in Tribology, Vol. II, Theory and Design**, Richard E. Booser Ed., CRC Press, Boca Raton, 1988; **CRC Handbook of Lubrication, Theory and Practice in Tribology, Vol. III, Monitoring, Materials, Synthetic Lubricants, and Applications**, Richard E. Booser, Ed., CRC Press, Boca Raton, 1993.
8. **Handbook of Lubrication and Tribology, Vol. I, Applications and Maintenance**, 2nd ed., George E. Totten, Ed., CRC Press, Boca Raton, 2006.
9. **Fundamentals of Tribology**, N. P. Suh and N. Saka, Eds., MIT Press, Cambridge, Massachusetts, 1980.
10. **Friction, Wear, Lubrication: A Text Book of Tribology**, Kenneth C. Ludema, Ed., CRC Press, Boca Raton, 1996.
11. **Introduction to Tribology**, Bharat Bhushan, John Wiley & Sons, Inc., 2002.

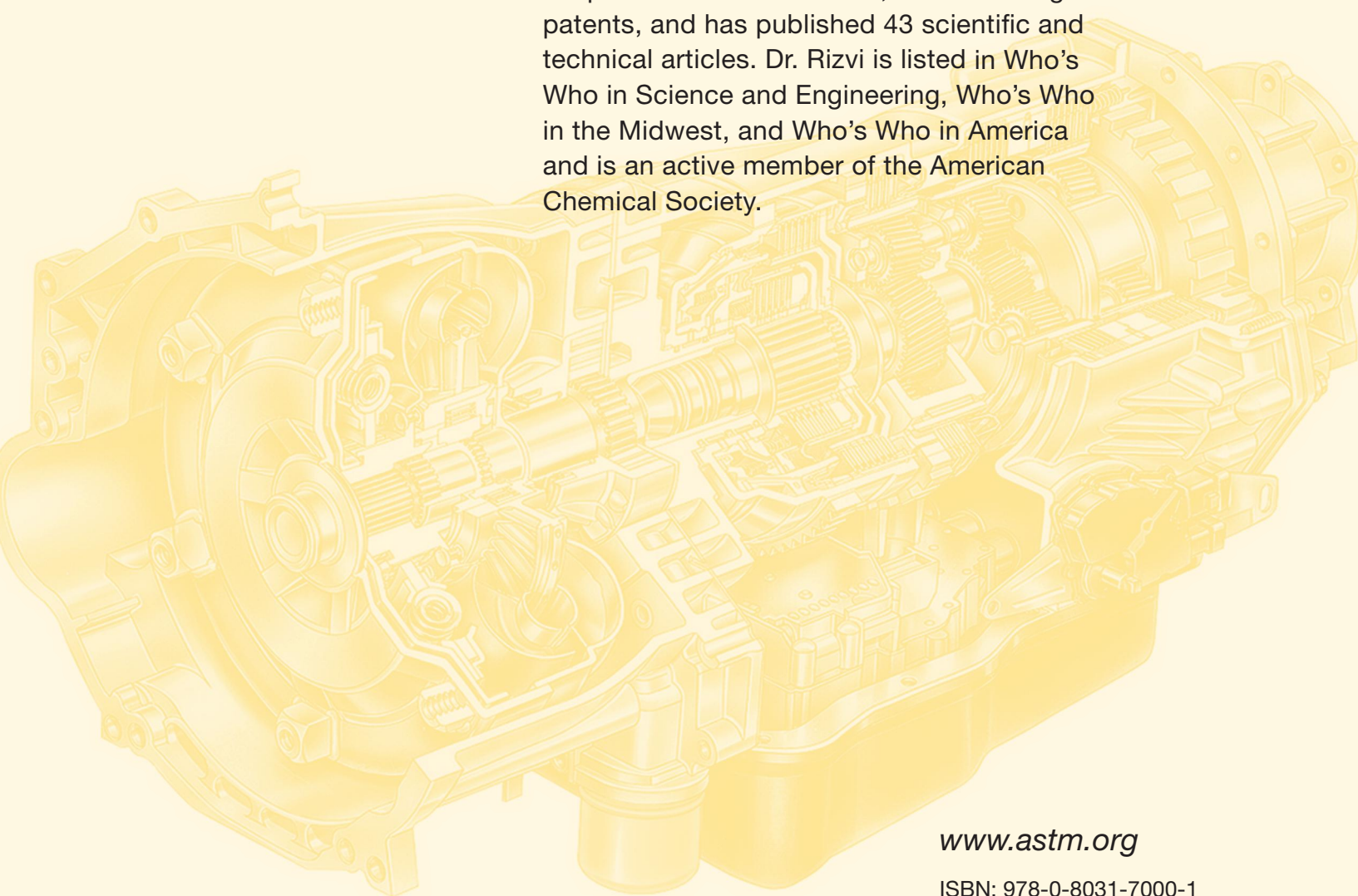
The present manuscript differs from these in that it is written both from a chemist's perspective and a lubrication engineer's perspective and therefore places equal emphasis on the chemistry and the formulation of lubricants. In addition, it includes additive technology that is used in petroleum exploration, refining, and fuels.

The finalizing of this manuscript would not have been possible without the help of many of my colleagues, at Lubrizol and elsewhere, my wife Marie, and my children Sophia and Ali. My colleagues provided me the technical advice and my family provided the needed moral support. In addition, I am indebted to Marie and Sophia for typing portions of the manuscript and reviewing the document for content, legibility, and grammar. I also wish to express my gratitude to the ASTM publications staff including Monica Siperko, most of who worked behind the scenes to make this publication possible. Above all, I am indebted to Kathy Dernoga of ASTM International who facilitated the completion of this book by providing continuous support.

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January 2009



Dr. Syed Q. A. Rizvi holds a Ph.D. in chemistry, an M.B.A. in marketing, and an M.A. in economics. He has 29 years of research and development experience pertaining to the development of lubricant additives, their formulations, and testing. During his career as a lubricant technologist Dr. Rizvi has authored many technical papers and made numerous presentations at both national and international technical and commercial organizations. Dr. Rizvi is the recipient of 14 U.S. Patents, over 26 foreign patents, and has published 43 scientific and technical articles. Dr. Rizvi is listed in Who's Who in Science and Engineering, Who's Who in the Midwest, and Who's Who in America and is an active member of the American Chemical Society.



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