Journal of ASTM International
Selected Technical Papers

STP 1521

Testing and Use of Environmentally Acceptable Lubricants

In-Sik Rhee
JAI Guest Editor

Journal of ASTM International Selected Technical Papers STP1521
Testing and Use of Environmentally Acceptable Lubricants

JAI Guest Editor:
In-Sik Rhee

ASTM International
100 Barr Harbor Drive
PO Box C700
West Conshohocken, PA 19428-2959

Printed in the U.S.A.

ASTM Stock #: STP1521

Library of Congress Cataloging-in-Publication Data

ISBN: 978-0-8031-7507-5

Journal of ASTM International (JAI) Scope

The JAI is a multi-disciplinary forum to serve the international scientific and engineering community through the timely publication of the results of original research and critical review articles in the physical and life sciences and engineering technologies. These peer-reviewed papers cover diverse topics relevant to the science and research that establish the foundation for standards development within ASTM International.

Photocopy Rights

Peer Review Policy

Each paper published in this volume was evaluated by two peer reviewers and at least one editor. The authors addressed all of the reviewers' comments to the satisfaction of both the technical editor(s) and the ASTM International Committee on Publications.

The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of the peer reviewers. In keeping with long-standing publication practices, ASTM International maintains the anonymity of the peer reviewers. The ASTM International Committee on Publications acknowledges with appreciation their dedication and contribution of time and effort on behalf of ASTM International.

Citation of Papers

When citing papers from this publication, the appropriate citation includes the paper authors, "paper title", J. ASTM Intl., volume and number, Paper doi, ASTM International, West Conshohocken, PA, Paper, year listed in the footnote of the paper. A citation is provided as a footnote on page one of each paper.

Printed in Bay Shore, NY
January, 2012

Foreword

THIS COMPILATION OF THE *JOURNAL OF ASTM INTERNATIONAL (JAI)*, STP1521, *Testing and Use of Environmentally Acceptable Lubricants*, contains only the papers published in JAI that were presented at a Symposium on Testing and Use of Environmentally Acceptable Lubricants held during December 6, 2010 in Jacksonville, FL, USA. The Symposium was sponsored by ASTM International Committee D02 on Petroleum Products and Lubricants.

The Symposium Chairman and STP Guest Editor is Dr. In-Sik Rhee, U.S. Army TARDEC, Warren, MI, USA.

Contents

Overview

Environmental safety and compliance has recently become the most significant worldwide issue. The generation of the potentially hazardous wastes by Petroleum not only cause both short and long term liability with respect to environmental damage, but can result in deteriorated mission performance and high cleanup costs. For the last several decades, there has been an interest in Environmentally Acceptance (EA) Lubricants, especially, among agricultural, construction, forestry, lumber, and mining industries where involuntary or accidental fluid leakage or spillage is detrimental to the environment. Another good reason to use EA lubricants is to develop a market for US grown agricultural feedstocks and to reduce on overseas petroleum crude oil. Currently, the biobased based lubricants are considered as EA lubricants due to their environmental properties such as a high biodegradability. The biobased lubricant is currently formulated with oils extracted from renewable resources such as plants, crops, trees or animals. These types of fluids are considered less toxic and more biodegradable that conventional petroleum based oils. The U.S. Department of Agriculture (USDA)'s biobased product guideline also defines exactly what products and how much concentration of renewable product associated with final product would be considered as a biobased product. In response to the demand of biobased lubricants, many oil companies have formulated biobased lubricants for the limited applications. To explore further develop this technology, researches have already been or are being conducted in the broad science field using biobased oils.

ASTM D.2.12 Subcommittee on Environmental Standards of Lubricants has a responsibility to promote the knowledge and the development of standards to measure environmental persistence of lubricants (e.g., biodegradation, ecotoxicity and bioaccumulation). To hold a forum for discussions related to current trends for EA lubricants, the Subcommittee 12 has initiated to have the first Environment Symposium on Testing and Use of Environmentally Acceptable Lubricants which was held on December 6, 2010 at Jacksonville, Florida. The purpose of this symposium was to provide details on current research efforts to advance use of biobased and other environmentally acceptable lubricants, and to develop new and improved environment test methods. Thirteen symposium papers were presented on the various topics related to the fundamentals of biobased lubricants, industrial trends, applications, new test methods, and environmental policies. All presentations were very innovated and well received from more than 400 attendees. Most of papers were published on the Journal of ASTM International after peer reviewed and ten papers among them were selected for presenting in STP. These papers are presented here.

Finally, the editor would like to acknowledge that this STP is a product of tremendous diligent efforts of many people. In particular, editor would like to thank ASTM D.2.12 symposium organizing committee, all of the authors, paper reviewers and session chairs who devoted their valuable time for this endeavor. Special thanks are due to Mary Mikoajewski, David Bradley, Suze Reilly and Linda Boniello for their enduring support, constructive feedbacks, and timely assistance.

Dr. In-Sik Rhee
Symposium Chairman and JAI Guest Editor
U.S. Army Tank, Automotive Research
Development and Engineering Center
Warren, Michigan

www.astm.org

ISBN: 978-0-8031-7507-5
Stock #: STP1521