FLAMMABILITY SENSITIVITY of MATERIALS IN OXYGEN-ENRICHED ATMOSPHERES

B. L. Werley editor

FLAMMABILITY AND SENSITIVITY OF MATERIALS IN OXYGEN-ENRICHED ATMOSPHERES

A symposium sponsored by ASTM Committee G-4 on Compatibility and Sensitivity of Materials in Oxygen-Enriched Atmospheres Phoenix, AZ, 31 March—1 April 1982

ASTM SPECIAL TECHNICAL PUBLICATION 812 B. L. Werley, Air Products and Chemicals, Inc., editor

ASTM Publication Code Number (PCN) 04-812000-17



Copyright © by AMERICAN SOCIETY FOR TESTING AND MATERIALS 1983 Library of Congress Catalog Card Number: 82-73766

NOTE

The Society is not responsible, as a body, for the statements and opinions advanced in this publication.

Printed in Baltimore, Md. (b) July 1983

Foreword

The symposium on Flammability and Sensitivity of Materials in Oxygen was held in Phoenix, Arizona, 31 March-1 April 1982, and was sponsored by ASTM Committee G-4 on Compatibility and Sensitivity of Materials in Oxygen-Enriched Atmospheres. Barry L. Werley, Air Products and Chemicals, Inc., and Robert E. Lowrie, Airco Central Research Laboratories, were co-chairmen of the symposium.

Related ASTM Publications

Fire Risk Assessment, STP 762 (1982), 04-762000-31

Toxic Materials in the Atmosphere, STP 786 (1982), 04-786000-17

Sampling and Analysis of Toxic Organics in the Atmosphere, STP 721 (1980), 04-721000-19

Calibration in Air Monitoring, STP 598 (1976), 04-598000-17

Instrumentation for Monitoring Air Quality, STP 555 (1974), 04-555000-17

A Note of Appreciation to Reviewers

The quality of the papers that appear in this publication reflects not only the obvious efforts of the authors but also the unheralded, though essential, work of the reviewers. On behalf of ASTM we acknowledge with appreciation their dedication to high professional standards and their sacrifice of time and effort.

ASTM Committee on Publications

ASTM Editorial Staff

Janet R. Schroeder Kathleen A. Greene Rosemary Horstman Helen M. Hoersch Helen P. Mahy Allan S. Kleinberg Virginia M. Barishek

Contents

Hiti oduction	1
Keynote Address — ASTM G 63: A Milestone in a 60-Year Safety Effort —ROBERT M. NEARY	3
NASA Mechanical Impact Testing in High-Pressure Oxygen — COLEMAN J. BRYAN	9
Determination of Autogenous Ignition Temperatures of a Steam Turbine Lubricating Oil in Nitrogen and Oxygen Mixtures—	
RICHARD W. McQUAID, DONALD G. SHEETS, AND MARY J. BIEBERICH	43
Oxygen Index Tests to Evaluate the Suitability of a Given Material fo Oxygen Service — GEORGE K. IKEDA	or 56
Measurement of Oxygen Index at Elevated Temperatures — MICHAEL A. BENNING	68
Heat of Combustion and Oxygen Compatibility—ROBERT LOWRIE	84
Techniques Employed by the NASA White Sands Test Facility to Ensure Oxygen System Component Safety — JACK S. STRADLING, DAVID L. PIPPEN, AND GENE W. FRYE	97
Oil-Film Hazards in Oxygen Systems — BARRY L. WERLEY	108
Metal Combustion in High-Pressure Flowing Oxygen — RAYMOND W. MONROE, CHARLES E. BATES, AND COULTAS D. PEARS	126
Friction-Induced Ignition in Oxygen — RUDOLF JENNY AND HANS R. WYSSMANN	150
Selection of Metals for Gaseous Oxygen Service — JOSEPH W. SLUSSER AND KEITH A. MILLER	167
Summary	193
Index	199