

STP 577

**CALCULATION OF
PHYSICAL PROPERTIES
OF PETROLEUM PRODUCTS
FROM
GAS CHROMATOGRAPHIC
ANALYSES**



AMERICAN SOCIETY FOR TESTING AND MATERIALS

CALCULATION OF PHYSICAL PROPERTIES OF PETROLEUM PRODUCTS FROM GAS CHROMATOGRAPHIC ANALYSES

**A symposium
sponsored by ASTM Committee D-2
on Petroleum Products and Lubricants
AMERICAN SOCIETY FOR
TESTING AND MATERIALS
Dallas, Tex., 6 Dec. 1973**

**ASTM SPECIAL TECHNICAL PUBLICATION 577
L. E. Green, symposium chairman
D. K. Albert, symposium co-chairman**

04-577000-39

**American Society for Testing and Materials
1916 Race Street, Philadelphia, Pa. 19103**

© BY AMERICAN SOCIETY FOR TESTING AND MATERIALS 1975
Library of Congress Catalog Card Number: 75-2511
ISBN 0-8031-0296-8

NOTE

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

Second Printing, Philadelphia, Pa.
August 1986

Printed in Lutherville-Timonium, Md.
May 1975

Foreword

The symposium on Correlations of ASTM D 2887-73 with Physical Properties of Petroleum Fractions was held in Dallas, Tex., 6 Dec. 1973. Committee D-2 on Petroleum Products and Lubricants sponsored the symposium. L. E. Green, Hewlett-Packard Company, presided as symposium chairman, and D. K. Albert, Standard Oil Company (Indiana), served as symposium co-chairman.

Related ASTM Publications

**Gas Chromatographic Data Compilation, AMD 25 A (1967),
(10-025010-39)**

**Gas Chromatographic Data Compilation, 1st Supplement, AMD 25 A-S1
(1971) (10-025011-39)**

A Note of Appreciation to Reviewers

This publication is made possible by the authors and, also, the unheralded efforts of the reviewers. This body of technical experts whose dedication, sacrifice of time and effort, and collective wisdom in reviewing the papers must be acknowledged. The quality level of ASTM publications is a direct function of their respected opinions. On behalf of ASTM we acknowledge with appreciation their contribution.

ASTM Committee on Publications

Editorial Staff

Jane B. Wheeler, *Managing Editor*
Helen M. Hoersch, *Associate Editor*
Charlotte E. Wilson, *Assistant Editor*
Ellen J. McGlinchey, *Assistant Editor*

Contents

Introduction	1
Newer and Fewer Petroleum Products Specifications—F. W. KROLL	5
Calculation of ASTM Method D 86-67 Distillation and Reid Vapor Pressure of a Gasoline from the Gas-Liquid Chromatographic True Boiling Point—W. DE BRUINE AND R. J. ELLISON	9
Characterization of Motor Gasoline	10
Information Required from GLC Data	10
RVP Model	11
ASTM Distillation Model	12
Performance of the ASTM Distillation Model for Gasolines	15
Conclusions	15
Correlation of ASTM Method D 2887-73 Boiling Range Distribution Data with ASTM Method D 86-67 Distillation Data—D. C. FORD, W. H. MILLER, R. C. THREN, AND R. WERTZLER	20
Prediction of Correlation Equations by Regression Analysis	21
Slope Approach to Correlation	22
Analysis of Data	27
Conclusions	30
Continuous On-Stream Analysis of Boiling Characteristics of Petroleum Fractions—J. H. MC LAUGHLIN, W. A. BAJEK, AND R. W. SAMPSON	31
Development of the Monirex Boiling Point Monitor	32
On-Stream Boiling Point Monitor	34
Field Installations and Data	37
Middle Distillate Operation	42
Current Apparatus Status	42
Control Systems	47
Monitors as Laboratory Instruments	48
Conclusion	48
Application of Gas Chromatographic Distillation to Motor Gasoline Blending—W. L. BIRD AND J. L. KIMBALL	51
Gasoline Blending Applications	52
Performance of the ASTM RVP Model	53
Performance of the ASTM Method D 86-67 Distillation Model	54
RVP Model, Calculation Procedure Based on GC Distillation of Gasoline Blends	55
RVP Model, Calculation Procedure Based on GC Distillation of Refinery Gasoline Components (Blending Stocks)	57

viii CONTENTS

Basis of RVP Model	58
ASTM Distillation Basic Model A, Calculation Procedure Based on GC Distillation of Gasoline Blends	58
Basis of ASTM Distillation Model	59
ASTM Distillation Model B, Scope, Calculation Procedures and Basis	62
ASTM Distillation Models, Predicting ASTM Distillation of Blends from GC Distillation of Refinery Gasoline Components	63
Ridge Regression ASTM Distillation Model	64
Reid Vapor Pressure of Hydrocarbon Mixtures—M. M. LUSKIN AND W. E. MORRIS	65
Partial Pressures and RVP	65
Experimental	67
Suggested Application	67
Some Comparisons of Boiling Range Distribution by Gas Chromatography with 15/5 Distillations—J. F. HICKERSON	71
Samples	72
GC Conditions	73
Results	74
Effect of Aromatics	75
Effect of GC Conditions	76
Discrepancy Between GC and 15/5 at Front End	77
Conclusions	79
Correlation of Simulated True Boiling Point Curves by Gas-Liquid Chromatography and 15 Plate Distillation Data (ASTM Method D 2892-73) on Crude Oils—N. G. MC TAGGART, P. GLAYSHER, AND A. F. HARDING	81
Equipment	82
Procedure	83
Experimental and Results	83
Discussion	90
Volatility Control by ASTM Method D 2887-73, A Feasibility Study—M. P. T. BRADLEY AND C. E. KENNARD	95
Procedure	99
Discussion	100
Conclusions	106

