Manual on Hydrocarbon Analysis

6th Edition

A. W. Drews, editor
Foreword

This sixth edition of the Manual on Hydrocarbon Analysis, sponsored by ASTM Committee D02 on Petroleum Products and Lubricants, has been expanded even further than the fifth edition. First appearing in 1963 as STP332, this manual was updated by Committee D02 in 1968, 1977, 1987, and 1992. In this 1998 edition, Part 2 has been expanded to include 26 additional ASTM test methods. Furthermore, the number of chapters has been increased from five to seven through the creation of a separate chapter, "Analysis of Kerosine, Diesel and Aviation Turbine Fuels," and a totally new chapter, "Analysis of Waxes." For additional information on the significance of tests, the reader is encouraged to consult the Manual on Significance of Tests for Petroleum Products, 6th Edition.

Methodology is changing quickly, requiring revisions to existing methods and the standardization of new ones. The impact of computerization and microprocessors cannot be overemphasized. Modern data-handling capabilities allow highly detailed compositional analyses to be performed that were once only a vision. Some of these resulting methods have been standardized; others will follow rapidly as experience is gained.

Industry and governmental requirements for accurate, more detailed data in a shorter time frame have resulted in substantial method changes. Rapid instrumental techniques, incorporating automatic sampling and on-line instrumentation, are replacing many of the time-honored empirical and, even, wet-chemical procedures. Yet many of the established techniques are still utilized and, thus, they are included in this manual along with the methods that are replacing them. It is exciting to speculate what further changes will occur before issuance of the next edition.

Publication of this manual would not have been possible without the efforts of the ASTM staff, the authors—N. G. Johansen, J. M. McCann, G. Hemighaus, T. M. Warne, A. J. Lubeck, A. D. Barker, C. H. Pfeiffer, the reviewers—S. E. Litka and N. D. Smith, and to L. A. Drews for collating, formatting, and reviewing the texts. I express my appreciation to all those who made this sixth edition a reality.

A. W. Drews, editor
Subcommittee D02.04 on Hydrocarbon Analysis
Purpose of Manual

The purpose of this manual is two-fold. The seven introductory chapters provide the analyst with a comprehensive overview of current practices and tests relating to the analysis of hydrocarbons. The accompanying collection of ASTM test methods furnishes a convenient reference within a single volume. It is hoped that this combination will provide the reader with a clearer understanding and appreciation of this diversified subject.
INTRODUCTORY INFORMATION

Introduction 3
Table 1—Summary of Product Types Produced from Petroleum 4
Table 2—Summary of ASTM Test Methods (by subject) 5
Table 3—Number of Isomeric Paraffins 11
Table 4—Summary of Hydrocarbon Types in Petroleum Fractions 11

PART 1—DISCUSSION OF ANALYSES BY PRODUCT TYPE

1 Analysis of C₅ and Lighter Hydrocarbons by N. G. Johansen 15
   Introduction 15
   Current Practices 15
   Future Trends 16

2 Analysis of Gasoline and Other Light Distillate Fuels by J. M. McCann 18
   Introduction 18
   Current Practices 18
   Future Trends 20

3 Analysis of Kerosine, Diesel, and Aviation Turbine Fuel by G. Hemighaus 22
   Introduction 22
   Current Practices 22
   Future Trends 23

4 Analysis of Viscous Oils by T. M. Warne 25
   Introduction 25
   Current Practices 25
   Future Trends 30

5 Analysis of Waxes by A. D. Barker 31
   Introduction 31
   Current Practices 31
   Future Trends 32

6 Analysis of Crude Oils by A. J. Lubeck 34
   Introduction 34
   Current Practices 35
   Future Trends 39

7 Analysis of Aromatic Hydrocarbons by C. H. Pfeiffer 41
   Introduction 41
   Current Practices 41
   Future Trends 42
PART 2—ASTM TEST METHODS

The test methods in this section are arranged in alphanumeric sequence. The page numbers apply only to this manual and not to the standard documents as they appear in the annual ASTM Book of Standards. See Table 2 for a list of test methods by subject. The following is a list of all test methods included in Part 2. It includes all test methods referenced in the seven chapters except as indicated in the chapters. It does not include all of the test methods cited in Table 2.

D5  Test Method for Penetration of Bituminous Materials 47
D36  Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus) 50
D56  Test Method for Flash Point by Tag Closed Tester 54
D86  Test Method for Distillation of Petroleum Products at Atmospheric Pressure 64
D87  Test Method for Melting Point of Petroleum Wax (Cooling Curve) 77
D96  Test Method for Water and Sediment in Crude Oil by Centrifuge Method (Field Procedure) 80
D97  Test Method for Pour Point of Petroleum Oils 87
D127  Test Method for Drop Melting Point of Petroleum Wax Including Petrolatum 95
D130  Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test 97
D189  Test Method for Conradson Carbon Residue of Petroleum Products 103
D287  Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method) 109
D323  Test Method for Vapor Pressure of Petroleum Products (Reid Method) 112
D341  Viscosity-Temperature Charts for Liquid Petroleum Products 120
D445  Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity) 126
D447  Test Method for Distillation of Plant Spray Oils 134
D473  Test Method for Sediment in Crude Oils and Fuels Oils by the Extraction Method 137
D482  Test Method for Ash from Petroleum Products 141
D524  Test Method for Ramsbottom Carbon Residue of Petroleum Products 144
D611  Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents 152
D664  Test Method for Acid Number of Petroleum Products by Potentiometric Titration 159
D721  Test Method for Oil Content of Petroleum Waxes 166
D848  Test Method for Acid Wash Color of Industrial Aromatic Hydrocarbons 172
D849  Test Method for Copper Strip Corrosion of Industrial Aromatic Hydrocarbons 175
D850  Test Method for Distillation of Industrial Aromatic Hydrocarbons and Related Materials 177
D852  Test Method for Solidification Point of Benzene 182
D853  Test Method for Hydrogen Sulfide and Sulfur Dioxide Content (Qualitative) of Industrial Aromatic Hydrocarbons 184
D972  Test Method for Evaporation Loss of Lubricating Greases and Oils 186
D976  Test Method for Calculated Cetane Index of Distillate Fuels 190
D1078  Test Method for Distillation Range of Volatile Organic Liquids 193
D1133  Test Method for Kauri-Butanol Value of Hydrocarbon Solvents 200
D1142  Test Method for Water Vapor Content of Gaseous Fuels by Measurement of Dew-Point Temperature 202
D1159  Test Method for Bromine Number of Petroleum Distillates and Commercial Aliphatic Olefins by Electrometric Titration 213
D1160  Test Method for Distillation of Petroleum Products at Reduced Pressure 222
D1209  Test Method for Color of Clear Liquids (Platinum-Cobalt Scale) 240
D1218  Test Method for Refractive Index and Refractive Dispersion of Hydrocarbon Liquids 243
D1250  Guide for Petroleum Measurement Tables 247
D1265  Practice for Sampling Liquefied Petroleum (LP) Gases (Manual Method) 249
D1298  Practice for Density, Relative Density (Specific Gravity) or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method 252
D1319  Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption 257
D1322  Test Method for Smoke Point of Aviation Turbine Fuels 263
D1492  Test Method for Bromine Index of Aromatic Hydrocarbons by Coulometric Titration 269
D1552  Test Method for Sulfur in Petroleum Products (High-Temperature Method) 272
D1685  Test Method for Traces of Thiolephene in Benzene by Spectrophotometry 277
D1747  Test Method for Refractive Index of Viscous Materials 280
D1840  Test Method for Naphthalene Hydrocarbons in Aviation Turbine Fuels by Ultra Violet Spectrophotometry 284
D1945  Test Method for Analysis of Natural Gas by Gas Chromatography 287
D1946  Practice for Analysis of Reformed Gas by Gas Chromatography 302
D2007  Test Method for Characteristic Groups in Rubber Extender and Processing Oils and Other Petroleum-Derived Oils by Clay-Gel Absorption Chromatographic Method 311
D2158  Test Method for Residues in Liquefied Petroleum (LP) Gases 318
D2163  Test Method for Analysis of Liquefied Petroleum (LP) Gases and Propene Concentrates by Gas Chromatography 322
D2171  Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer 327
D2306  Test Method for C₄ Aromatic Hydrocarbon Analysis by Gas Chromatography 334
D2360  Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by Gas Chromatography 337
D2386  Test Method for Freezing Point of Aviation Fuels 342
D2425  Test Method for Hydrocarbon Types in Middle Distillates by Mass Spectrometry 346
D2426  Test Method for Butadiene Dimer and Styrene in Butadiene Concentrates by Gas Chromatography 352
D2500  Test Method for Cloud Point of Petroleum Oils 355
D2501  Test Method for Calculation of Viscosity-Gravity Constant (VGC) of Petroleum Oils 358
D2502  Test Method for Estimation of Molecular Weight (Relative Molecular Mass) of Petroleum Oils from Viscosity Measurements 361
D2503  Test Method for Relative Molecular Mass (Molecular Weight) of Hydrocarbons by Thermolectric Measurement of Vapor Pressure 365
D2504  Test Method for Noncondensable Gases in C₄ and Lighter Hydrocarbon Products by Gas Chromatography 368
D2505  Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by Gas Chromatography 373
D2549  Test Method for Separation of Representative Aromatics and Nonaromatics Fractions of High Boiling Oils by Elution Chromatography 379
D2593  Test Method for Butadiene Purity and Hydrocarbon Impurities by Gas Chromatography 385
D2597  Test Method for Analysis of Demethanized Hydrocarbon Liquid Mixtures Containing Nitrogen and Carbon Dioxide by Gas Chromatography 392
D2622  Test Method for Sulfur in Petroleum Products by X-Ray Spectrometry 402
D2650  Test Method for Chemical Composition of Gases by Mass Spectrometry 406
D2710  Test Method for Bromine Index of Petroleum Hydrocarbons by Electrometric Titration 413
D2712  Test Method for Hydrocarbon Traces in Propylene Concentrates by Gas Chromatography 420
D2784  Test Method for Sulfur in Liquefied Petroleum Gases (Oxy-Hydrogen Burner or Lamp) 426
D2786  Test Method for Hydrocarbon Types Analysis of Gas-Oil Saturates Fractions by High Ionizing Voltage Mass Spectrometry 432
D2878  Test Method for Estimating Apparent Vapor Pressures and Molecular Weights of Lubricating Oils 439
D2887  Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography 444
D2892  Test Method for Distillation of Crude Petroleum (15-Theoretical Plate Column) 455
D3054  Test Method for Purity and Benzene Content of Cyclohexane by Gas Chromatography 484
D3120  Test Method for Trace Quantities of Sulfur in Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry 488
D3205  Test Method for Viscosity of Asphalt with Cone and Plate Viscometer 493
D3227  Test Method for Mercaptan Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method) 498
D3230  Test Method for Salts in Crude Oil (Electrometric Method) 503
D3235  Test Method for Solvent Extractables in Petroleum Waxes 508
D3239  Test Method for Aromatic Types Analysis of Gas-Oil Aromatic Fractions by High Ionizing Voltage Mass Spectrometry 514
D3241  Test Method for Thermal Oxidation Stability of Aviation Turbine Fuels (JFTOT Procedure) 527
D3246  Test Method for Sulfur in Petroleum Gas by Oxidative Microcoulometry 538
D3279  Test Method for Heptane Insolubles 545
D3524  Test Method for Diesel Fuel Diluent in Used Diesel Engine Oils by Gas Chromatography 548
D3606  Test Method for the Determination of Benzene and Toluene in Finished Motor and Aviation Gasoline by Gas Chromatography 552
D3700  Practice for Containing Hydrocarbon Fluid Samples Using a Floating Piston Cylinder 559
D3701  Test Method for Hydrogen Content of Aviation Turbine Fuels by Low Resolution Nuclear Magnetic Resonance Spectrometry 563
Test Method for Boiling Range Distribution of Gasoline and Gasoline Fractions by Gas Chromatography

Test Method for Analysis of Isopropyl Benzene (Cumene) by Gas Chromatography

Test Method for Analysis of o-Xylene by Gas Chromatography

Test Method for Analysis of p-Xylene by Gas Chromatography

Test Method for Trace Quantities of Sulfur in Liquid Aromatic Hydrocarbons by Oxidative Microcoulometry

Test Method for Water in Crude Oil by Distillation

Test Method for Water and Sediment in Crude Oil by the Centrifuge Method (Laboratory Procedure)

Test Method for Sulfur in Petroleum Products by Hydrogenolysis and Rateometric Colorimetry

Test Method for Density and Relative Density of Liquids by Digital Density Meter

Test Method for Benzene in Motor and Aviation Gasoline by Infrared Spectroscopy

Practice for Manual Sampling of Petroleum and Petroleum Products

Practice for Automatic Sampling of Petroleum and Petroleum Products

Test Method for Trace Ethylene Glycol in Used Engine Oil

Test Method for Sulfur in Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectroscopy

Practice for Preparation of Liquid Blends for Use as Analytical Standards

Test Method for Benzene in Hydrocarbon Solvents by Gas Chromatography

Test Method for Water in Crude Oils by Potentiometric Karl Fischer Titration

Test Method for Measurement of Transition Temperatures of Petroleum Waxes by Differential Scanning Calorimetry

Test Method for Determination of Carbon Residue (Micro Method)

Test Method for Benzene Content of Cyclic Products by Gas Chromatography

Test Method for Analysis of Barium, Calcium, Magnesium and Zinc in Unused Lubricating Oils by Atomic Absorption


Test Method for Determination of Trace Thiophene in Refined Benzene by Gas Chromatography

Test Method for Calculated Cetane Index by Four Variable Equation

Test Method for Hydrogen Content of Light Distillates, Middle Distillates, Gas Oils, and Residua by Low Resolution Nuclear Magnetic Resonance Spectroscopy

Test Method for Hydrogen Sulfide in Natural Gas Using Length-of-Stain Detector Tubes

Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography

Test Method for Determination of Traces of Methanol in Propylene Concentrates by Gas Chromatography

Test Method for Water Vapor in Natural Gas Using Length-of-Stain Detector Tubes

Test Method for Elemental Analysis of Lubricant and Additive Components—Barium, Calcium, Phosphorus, Sulfur and Zinc by Wavelength-Dispersive X-Ray Fluorescence Spectroscopy

Test Method for Water in Crude Oils by Coulometric Karl Fischer Titration

Test Method for Determination of Organic Chloride Content in Crude Oil

Test Method for Determination of Additive Elements in Lubricating Oils by Inductively Coupled Plasma Atomic Emission Spectrometry

Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)

Test Method for Density and Relative Density of Crude Oils by Digital Density Analyzer

Test Method for Determining Impurities in High-Purity Ethylbenzene by Gas Chromatography

Test Method for Detailed Analysis of Petroleum Naphthas Through Nonane by Capillary Gas Chromatography

Test Method for Analysis of Styrene by Capillary Gas Chromatography


Test Method for the Determination of the Aromatic Content and Polynuclear Aromatic Content of Diesel Fuels and Aviation Turbine Fuels by Supercritical Fluid Chromatography

Test Method for Vapor Pressure of Petroleum Products (Automatic Method)

Test Method for Vapor Pressure of Petroleum Products (Mini Method)
<table>
<thead>
<tr>
<th>Document Number</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5194</td>
<td>Test Method for Trace Chloride in Liquid Aromatic Hydrocarbons</td>
<td>821</td>
</tr>
<tr>
<td>D5234</td>
<td>Guide for Analysis of Ethylene Product</td>
<td>824</td>
</tr>
<tr>
<td>D5236</td>
<td>Test Method for Distillation of Heavy Hydrocarbon Mixtures (Vacuum Potstill Method)</td>
<td>826</td>
</tr>
<tr>
<td>D5273</td>
<td>Guide for Analysis of Propylene Concentrates</td>
<td>842</td>
</tr>
<tr>
<td>D5274</td>
<td>Guide for Analysis of 1,3-Butadiene Product</td>
<td>845</td>
</tr>
<tr>
<td>D5287</td>
<td>Practice for Automatic Sampling of Gaseous Fuels</td>
<td>847</td>
</tr>
<tr>
<td>D5291</td>
<td>Test Method for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products</td>
<td>852</td>
</tr>
<tr>
<td>D5292</td>
<td>Test Method for Aromatic Carbon Content of Hydrocarbon Oils by High Resolution Nuclear Magnetic Resonance</td>
<td>857</td>
</tr>
<tr>
<td>D5303</td>
<td>Test Method for Trace Carbonyl Sulphide in Propylene by Gas Chromatography</td>
<td>864</td>
</tr>
<tr>
<td>D5307</td>
<td>Test Method for Determination of the Boiling Range Distribution of Crude Petroleum by Gas Chromatography</td>
<td>870</td>
</tr>
<tr>
<td>D5384</td>
<td>Test Method for Chlorine in Used Petroleum Products (Field Test Kit Method)</td>
<td>877</td>
</tr>
<tr>
<td>D5386</td>
<td>Test Method for Color of Liquids Using Tristimulus Colorimetry</td>
<td>880</td>
</tr>
<tr>
<td>D5442</td>
<td>Test Method for Analysis of Petroleum Waxes by Gas Chromatography</td>
<td>883</td>
</tr>
<tr>
<td>D5443</td>
<td>Test Method for Paraffin, Naphthene and Aromatic Hydrocarbon Type Analysis in Petroleum Distillates</td>
<td>890</td>
</tr>
<tr>
<td></td>
<td>Through 200°C by Multi-Dimensional Gas Chromatography</td>
<td></td>
</tr>
<tr>
<td>D5453</td>
<td>Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels, and Oils by Ultraviolet Fluorescence</td>
<td>900</td>
</tr>
<tr>
<td>D5454</td>
<td>Test Method for Water Vapor Content of Gaseous Fuels Using Electronic Moisture Analyzers</td>
<td>906</td>
</tr>
<tr>
<td>D5482</td>
<td>Test Method for Vapor Pressure of Petroleum Products (Mini Method-Atmospheric)</td>
<td>908</td>
</tr>
<tr>
<td>D5503</td>
<td>Practice for Natural Gas Sample-Handling and Conditioning Systems for Pipeline Instrumentation</td>
<td>912</td>
</tr>
<tr>
<td>D5504</td>
<td>Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and</td>
<td>917</td>
</tr>
<tr>
<td></td>
<td>Chemiluminescence</td>
<td></td>
</tr>
<tr>
<td>D5580</td>
<td>Test Method for Determination of Benzene, Toluene, Ethylbenzene, p/m-Xylene, o-Xylene, C_9</td>
<td>922</td>
</tr>
<tr>
<td></td>
<td>and Heavier Aromatics, and Total Aromatics in Finished Gasoline by Gas Chromatography</td>
<td></td>
</tr>
<tr>
<td>D5599</td>
<td>Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection</td>
<td>931</td>
</tr>
<tr>
<td>D5622</td>
<td>Test Method for the Determination of Total Oxygen in Gasoline and Methanol Fuels by Reductive Pyrolysis</td>
<td>939</td>
</tr>
<tr>
<td>D5623</td>
<td>Test Method for Sulfur Compounds in Light Petroleum Liquids by Gas Chromatography and Sulfur Selective Detection</td>
<td>943</td>
</tr>
<tr>
<td>D5713</td>
<td>Test Method for Analysis of High Purity Benzene for Cyclohexane Feedstock by Capillary Gas Chromatography</td>
<td>953</td>
</tr>
<tr>
<td>D5762</td>
<td>Test Method for Nitrogen in Petroleum and Petroleum Products by Boat-Inlet Chemiluminescence</td>
<td>956</td>
</tr>
<tr>
<td>D5769</td>
<td>Test Method for Determination of Benzene, Toluene and Total Aromatics in Finished Gasoline by Gas Chromatography/Mass Spectrometry</td>
<td>961</td>
</tr>
<tr>
<td>D5776</td>
<td>Test Method for Bromine Index of Aromatic Hydrocarbons by Electrometric Titration</td>
<td>972</td>
</tr>
<tr>
<td>D5799</td>
<td>Test Method for Determination of Peroxides in Butadiene</td>
<td>975</td>
</tr>
<tr>
<td>D5808</td>
<td>Test Method for Determining Organic Chloride in Aromatic Hydrocarbons and Related Chemicals by Microcoulometry</td>
<td>977</td>
</tr>
<tr>
<td>D5842</td>
<td>Practice for Sampling and Handling of Fuels for Volatility Measurement</td>
<td>981</td>
</tr>
<tr>
<td>D5845</td>
<td>Test Method for the Determination of MTBE, ETBE, TAME, DIPE, Methanol, Ethanol and tert-Butanol in Gasoline by Infrared Spectroscopy</td>
<td>988</td>
</tr>
<tr>
<td>D5853</td>
<td>Test Method for Pour Point of Crude Oils</td>
<td>993</td>
</tr>
<tr>
<td>D5917</td>
<td>Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by Gas Chromatography and External Calibration</td>
<td>1005</td>
</tr>
<tr>
<td>D5986</td>
<td>Test Method for the Determination of Oxygenates, Benzene, Toluene, C_9–C_12 Aromatics and Total Aromatics in Finished Gasolines by Gas Chromatography/Fourier Transform Infrared Spectroscopy (GC/FTIR)</td>
<td>1011</td>
</tr>
<tr>
<td>D6069</td>
<td>Test Method for Trace Nitrogen in Aromatic Hydrocarbons by Oxidative Combustion and Reduced Pressure Chemiluminescence Detection</td>
<td>1025</td>
</tr>
<tr>
<td>D6144</td>
<td>Test Method for Analysis of AMS (α-Methylstyrene) by Gas Chromatography</td>
<td>1030</td>
</tr>
<tr>
<td>D6159</td>
<td>Test Method for Determination of Hydrocarbon Impurities in Ethylene by Gas Chromatography</td>
<td>1034</td>
</tr>
<tr>
<td>Reference</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>D6160</td>
<td>Test Method for Determination of Polychlorinated Biphenyls (PCBs) in Waste Materials by Gas Chromatography</td>
<td>1039</td>
</tr>
<tr>
<td>D6212</td>
<td>Test Method for Total Sulfur in Aromatic Compounds by Hydrogenolysis and Rateometric Colorimetry</td>
<td>1054</td>
</tr>
</tbody>
</table>
A L B E R T  W .  D R E W S

S ince retirement in 1994 from the UOP Research Center in Des Plaines, IL, Albert W. Drews has served as a consultant for AC Analytical Controls. Mr. Drews started working for UOP in 1960 following his graduation from Elmhurst College (IL) with a B.S. degree in chemistry. He held the positions of Supervisor of the Gas Chromatography Laboratory, Manager of the Analytical Laboratories and Manager of Method Development. His career has focused on the analytical analysis of petroleum products and catalysts, with an emphasis on gas chromatography and physical testing.

Mr. Drews has been associated with ASTM activities for 38 years with active membership in Committee D02 on Petroleum Products and Lubricants since 1976. He has served as author of numerous methods and practices, editor, subcommittee chairman, first vice-chairman of Committee D02 and as a member of the Committee on Standards. Drews has been honored with numerous ASTM awards including the Committee D02 Scroll of Achievement, the Award of Excellence, Honorary D02 Membership, the Lowrie B. Sargent, Jr. Medal, and the ASTM Award of Merit.

Drews continues his active participation in Committee D02 while enjoying the benefits of retirement.