

STP 1468

ELEMENTAL ANALYSIS of FUELS and LUBRICANTS: Recent Advances and Future Prospects

Editor: R. A. Kishore Nadkarni,

Contents

Overview

Zen and the Art (or is it Science) of a Perfect Analysis—R. A. K. NADKARNI 1

Atomic Emission Spectroscopy

Analysis of Gasoline and Diesel Fuel Samples by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Using Pneumatic Nebulizer and Standard Spray Chamber—C. C. ONYESO 17

Elemental Analysis of Lubricating Grease by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)—B. S. FOX 24

The Use of Microwave Digestion and ICP to Determine Elements in Petroleum Samples—J. D. HWANG, M. HORTON, AND D. LEONG 33

Advances in ICP-MS Technologies for Characterization and Ultra-Trace Speciation as a Tool for the Petroleum Industry —J. PASZEK, K. J. MASON, A. S. MENNITO, AND F. C. MCELROY 42

Direct Trace and Ultra-Trace Metals Determination in Crude Oil and Fractions by Inductively Coupled Plasma Mass Spectrometry—S. DREYFUS, C. PECHEYRAN, C. MAGNIER, A. PRINZHOFER, C. P. LIENEMANN, AND O. F. X. DONARD 51

Fuel Analysis by Filter Furnace Electrothermal Atomic Absorption Spectrometry—P. TITTARELLI, M. PRIOLA, S. RICCHIUTO, D. A. KATSKOV, AND P. NGOBENI 59

Rotrode Filter Spectroscopy, a Recently Improved Method to Detect and Analyze Large Wear and Contaminant Particles in Fluids—M. LUKAS, R. J. YURKO, AND D. P. ANDERSON 71

Sulfur Determination and X-Ray Fluorescence

Trace Levels of Sulfur in the Fuels of the Future: Analytical Perspective—R. A. K. NADKARNI 85

Analysis of Fuels, Lubricants, and Greases Using X-Ray Fluorescence

Spectrometry—J. WOLSKA, B. VREBOS, AND P. BROUWER	98
Determination of Sulfur Content in Crude Oil Using On-Line X-Ray Transmission Technology—S. FESS	108
Low Level Sulfur in Fuel Determination Using Monochromatic WDXRF—ASTM D 7039-04—Z. W. CHEN, F. WEI, I. RADLEY, AND B. BEUMER	116
Latest Improvements on Using Polarized X-Ray Excitation EDXRF for the Analysis of Low Sulfur Content in Automotive Fuel—D. WISSMANN	128
Rapid Determination of Sulfur in Liquid Hydrocarbons for At-Line Process Applications Using Combustion/Oxidation and UV-Fluorescence Detection—S. TARKANIC AND J. CRNKO	137
Pyro-Electrochemical On-Line Ultra Low Sulfur Analyzer—J. R. RHODES	152
DP-SCD and LTMGC for Determination of Low Sulfur Levels in Hydrocarbons—R. L. GRAS, J.C. LUONG, R. V. MUSTACICH, AND R. L. SHEARER	164

Mercury Determination

Sampling and Analysis of Mercury in Crude Oil—S. M. WILHELM, D. A. KIRCHGESSNER, L. LIANG, AND P. H. KARIHER	183
Determination of Total Mercury in Crude Oil by Combustion Cold Vapor Atomic Absorption Spectrometry (CVAAS)—B. S. FOX, K. J. MASON, AND F. C. MCELROY	198
Mercury Measurements in Fossil Fuels Particularly Petrochemicals—P. B. STOCKWELL, W. T. CORNS, AND D. W. BRYCE	209

Other Heteroatoms

Recent Advances in Gas Chromatographic/Atomic Emission Hetero-Atom Selective Detection for Characterization of Petroleum Streams and Products—F. P. DISANZO AND J. W. DIEHL	223
Improvements in the Determination of Fluorine in Fuel and Lubricants by Oxidative Combustion and Ion Selective Electrode Detection—L. J. NASH	234
Phosphorus Additive Chemistry and its Effects on the Phosphorus Volatility of Engine Oils—T. W. SELBY, R. J. BOSCH, AND D. C. FEE	241
Analysis of the Volatiles Generated During the Selby-Noack Test by ³¹ P NMR Spectroscopy—R. J. BOSCH, D. C. FEE, AND T. W. SELBY	257