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5.3 Biostimulation and Bioaugmentation of Contaminated Sites5.4 Monitored Natural Attenuation; 5.5 Soil Vapor Extraction, Air Sparging, and Bioventing; 5.6 Use of Biosurfactants; 5.7 Rhizosphere Bioremediation; 5.8 Bioengineering in Bioremediation; 6 Test Methods for Biodegradation; 7 References; 2 Petroleum Composition and Properties; 1 Introduction; 2 Composition; 2.1 Elemental Composition; 2.2 Chemical Composition; 2.3 Composition by Volatility; 2.4 Composition by Fractionation; 2.5 Composition by Spectroscopy; 2.5.1 Infrared Spectroscopy; 2.5.2 Nuclear Magnetic Resonance
2.5.3 Mass Spectrometry2.5.4 Other Techniques; 3 Properties; 3.1 Density and Specific Gravity; 3.2 Elemental (Ultimate) Analysis; 3.3 Chromatographie Fractionation; 3.4 Liquefaction and Solidification; 3.5 Metals Content; 3.6 Surface and Interfacial Tension; 3.7 Viscosity; 3.8 Volatility; 4 References; 3 Refinery Products and By-Products; 1 Introduction; 2 Refinery Products; 2.1 Liquefied Petroleum Gas; 2.2 Naphtha, Gasoline, and Solvents; 2.3 Kerosene and Diesel Fuel; 2.4 Fuel Oil; 2.5 Lubricating Oil; 2.6 White Oil, Insulating Oil, Insecticides; 2.7 Grease; 2.8 Wax; 2.9 Asphalt; 2.10 Coke
3 Refinery Chemicals3.1 Spent Caustic; 3.2 Spent Acids; 3.3 Spent Catalysts; 3.3.1 Demet; 3.3.2 Met-X; 4 References; 4 Composition and Properties of Gaseous Products; 1 Introduction; 2 Gaseous Products; 2.1 Liquefied Petroleum Gas; 2.2 Natural Gas; 2.3 Refinery Gas; 3 Environmental Effects; 4 Analysis; 4.1 Calorific Value (Heat of Combustion); 4.2 Composition; 4.3 Density; 4.4 Relative density; 4.5 Sulfur; 4.6 Volatility and Vapor Pressure; 5 References; 5 Composition and Properties of Liquid Products; 1 Introduction; 2 Naphtha; 2.1 Composition; 2.2 Density (Specific Gravity)
2.3 Evaporation Rate2.4 Flash Point; 2.5 Odor and Color; 2.6 Volatility; 2.7 Environmental Impact; 3 Fuel Oil; 3.1 Asphaltene Content; 3.2 Composition; 3.3 Density (Specific Gravity); 3.4 Elemental Analysis; 3.5 Flash Point; 3.6 Metals Content; 3.7 Pour Point and Viscosity; 3.8 Stability; 3.9 Environmental Impact; 4 Wastewaters; 5 References; 6 Composition and Properties of Solid Products; 1 Introduction; 2 Residua and Asphalt; 2.1 Acid Number; 2.2 Asphaltene Content; 3.3 Carbon Disulfide Insoluble Constituents; 2.4 Composition; 2.5 Density (Specific Gravity); 2.6 Elemental Analysis
2.7 Float Test

Sommario/riassunto

With petroleum-related spills, explosions, and health issues in the headlines almost every day, the issue of remediation of petroleum and petroleum products is taking on increasing importance, for the survival of our environment, our planet, and our future. This book is the first of its kind to explore this difficult issue from an engineering and scientific point of view and offer solutions and reasonable courses of action.