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Determination of Fuel Oils in Soil Using Mechanical Shaking and Gas Chromatography-Mass Spectrometry

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ABSTRACT

Throughout the 20th century there has been a rapid increase in contamination of soil with oil and its derivatives, due to petroleum spills, industrial wastes, and transport and storage accidents. Among the environmental influences known to affect biodegradation of soil petroleum hydrocarbons, temperature and nutrient availability are two of the more important, particularly in cold-region soils. Hydrocarbon pollution of the subsurface, especially in unsaturated soils, has become a big problem with the development of the petrochemical industry and installation of numerous petrol stations and underground pipes. Physical, chemical and biological technologies have been developed to remove hydrocarbon pollutants from soils and restore environmental quality. However, costs are high, and many techniques are difficult to use for in-situ remediation. It still remains necessary to study the natural attenuation of hydrocarbons in soil and to develop simple cost-effective techniques for enhanced remediation. The TPH method is extraction, quantitation method of oil- contaminated level from soil, highly divided into gasoline range organics (GRO) and diesel range organics (DRO). A gasolines comprises low molecular weight alkanes (C5-C10). A large proportion of gasoline is made up of BTEX (benzene, toluene, ethylbezene, and m-, o- and p-xylene) components, which are relatively soluble and would degrade readily under the right environmental conditions. If more than one TPH weight fraction (gasoline, diesel, residual) may be present at the site, multiple analyses will be required, resulting in high analytical costs that are further increased by the rapid turn around times often needed

to insure timely decision making during the sample event[10]. A number of studies have reported SFE (supercritical fluid extraction) methods for extraction of TPH and PCBs from soil[11-13]. Generally, GC-ECD results for SFE extracts and GC-ECD results for Soxhlet extracts are compared. In addition to these research reports, the US environmental Protection Agency (EPA) has published a SFE method for extraction of TPH and PCBs from solid matrices.

In this paper, quantitation methods of total petroleum hydrocarbons to determinate oil contaminated level in soil were discussed. Extraction characteristics of several pretreatment methods and practical detection limit and reappearances in gas chromatography/mass spectrometry with each pretreatment method were investigated

Key words : Soil contamination, Total petroleum hydrocarbon(TPH), Extraction of TPH, Quantitation of TPH