Evaluation and Treatment of Petroleum Wastes Produced From Some Installation Tanks and Fuel Stations

By

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B.Sc. (Chemistry),Ain Shams University,(1984)

M. Sc. In Environmental Science, Institute of Environmental Studies and Research-Ain Shams University ,(2006)

A Thesis Submitted in Partial Fulfillment of the Requirement

for

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Department of Environmental Basic Science

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Abstract

Soil samples were collected from nine fuel service stations situated on western agricultural roads (Cairo/ Alexandria road) and one main installation located at Mostorod area. The samples were subjected to four types of chemical analyses: simple gravimetric, column chromatography, gas chromatography and high performance liquid chromatography (HPLC).The results obtained revealed that the soils of these sites are highly contaminated with hydrocarbon pollutants. Polynuclear aromatic hydrocarbons (PAHs) which are considered as the most hazardous pollutants also exist in measurable amounts.

The extracts from soil samples were fractionated using column chromatograph to determine saturate % ,mono-aromatic % ,di-aromatic % and poly-aromatic percentages. Also analyses of the aromatic compounds using high performance liquid chromatography proved that the total concentrations are ranging between 0.11and 7.93 μg/g dry weight. This means that PAHs exist in the collected samples in measurable amounts.

Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
CCME	Canadian Council of Ministers of the Environment
CPI	Carbon preference Index
EPA	Environmental Protection Agency
ITOPF	The International Tankers Owners Pollution Federation
MOPI	Means of comprising levels of petrogenic hydrocarbons
PAHs	Polycyclic Aromatic Hydrocarbon
PH	Phytane
PR	Pristane
R	Resolved compounds in the gas chromatogram
RES_H	Total resolved hydrocarbons in the hexane fraction
U	Unresolved compounds in the gas chromatogram
UCM	Unresolved Complex Mixture
UCM_B	Unresolved complex mixture in the benzene fraction
UCM_H	Unresolved complex mixture in the hexane fraction
WR	Weathering Ratio

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AIM OF THE WORK

Petroleum and its refinery products can be accidentally or deliberately released into the environment leading to serious pollution problems. It is well established that hydrocarbon contaminants cause a number of adverse negative impacts on human health, aquacultures, tourism, ecosystem and eventually the national income.

Fuel service stations are usually spread in both rural and urban regions. These stations offer a variety of services e.g. fuel supply, lubricating oil exchange, car washing etc…. A release of some of these hydrocarbon products to the environment might occur either due to some spillage or leakage or even caused by the accidental charging and discharging processes, the wastes of these processes are sometimes released to the environment causing soil contamination.

In this investigation, soil samples from nine fuel stations situated on Cairo/Alexandria agricultural western roads (the grounds of most of these stations are usually dusty, and hence susceptible to more pollution by the hydrocarbon wastes) and from the location of Misr Petroleum Company store tanks (at Mostorod) were collected. These samples were subjected to gravimetric, column chromatography, GC and HPLC analyses in an attempt to measure the extent, types and the total of hydrocarbon pollutants in each sample at these sites.

The study aims to find a suitable and effective method for treating the passive effects in these polluted sites and