

Determination of Total Hydrocarbon in Contaminated Soil by using Mixture Standard Samples

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Abstract: Many types of Soils are contaminated by Total Petroleum Hydrocarbons (TPH) as Mixture from it. This study depend on Idea that contaminated soil contain range of TPH with UV absorbance corresponding to TPH contents. Using range of TPH from different hydrocarbons contaminated soil sites as mixture standards sample as an easy, adequate and accurate methods for determination of TPH in any soils. The results demonstrate the absorption tip was constant at 240 and 210 nm for the MSS solute in CH_2Cl_2 and hexane and there is a linear relation between the concentrations of MSS and identical UV absorbance fitted, CH_2Cl_2 ($r = 0.9977$) and hexane ($r = 0.996$).

INTRODUCTION

Pollution is defined as any change that occurs in the ecosystem, causing a change in the basic characteristics of that ecosystem^[1]. Most factories in the world was revealed pollution caused by different kinds of pollutants such as Petroleum Hydrocarbons (PHs) that produced from incomplete combustion of many fuels^[2]. Most soils are Contaminated by agricultural and industrial releases caused hydrocarbon pollution that lead to mutagenic, carcinogenic and toxic characteristics^[3]. Pollution results dangerous effect upon the all environmental systems, Pollution by petroleum hydrocarbons lead to adverse affects the most soils characteristics and eventually affecting all organisms^[4]. Some researcher tend to biodegradation pf Hdrocarbons by microorganisms based on the hydrocarbons gene^[5] Petrol seepage lead to the destruction of soil characteristics and living organisms^[6]. Coal mine swag include poisonous (PAHs) obtained from charcoal which can be relieved by revegetation with appropriate plants^[7]. Some microbes are able to convert hydrocarbon compounds into un risk molecules such as

CO_2 and H_2O , through the biodegradation of hydrocarbons that must focused on it^[8]. Oil pollution represents hazardous agent important now. It can play role in destruction of habitat. The ecoologists are afraid from this type of pollution and must be management it^[9]. Petroleum hydrocarbons contamination area from soil to aquatic environment become a certain problem in the present life^[10]. By the decrease of point sources in the last time, non-point sources: atmospheric precipitation and roof runaway comprise most information into the environment^[11, 12]. The roteine ways for detection of Hydrocarbons, especially by Chromatographic devices (GC-HPLC-GCMS). These ways are already linked to a period of extraction methods for specific pollutants, huge quantity of solvents and increase the money expenditure for materials^[13, 14]. In several status, a group of costly tests devices is required for tests of unknown hydrocarbons. Thus, it is needful to improve easy, appropriate, exact and susceptible process to examine the range of soil pollution by hydrocarbon combination instead of the ordinary costly device^[15].

MATERIALS AND METHODS

Collection of samples: Soil samples contaminated with hydrocarbons were collected:

- First sample: from an industrial site
- Second sample: 50 m from the first site
- Third sample: after 70 m from the first site
- Fourth sample from un contaminated soil used as Control

Preparation of samples: All samples was has been dried, chrushing and sieved by a 2 mm diameter screen to maintain the soil charactyeristics. The procedure include of the making of Standards, inquiry of UV intake peak of the Standards and making of standarization curve and recall tests.

Production of MSS: 100 g of the polluted soil was primarily put in 250 mL of pure glass flask with add of 200 ml of hexane (Sigma,Germany) and Shake it manually and open stopper to stop the pressure inside flask and placed in an mechanical shaker by 176 cycle/min. for 60 min. Next, the hanging organic layer was incubated for 48 h. at room temperature, this layer was carry to other container, the procedure was duplicate. Eventually, this layer was concentrated by rotary evaporators (first: 100 cycle/min. at 60°C and second :100 cycle/min. at 90°C) until dried form. The remaining in container was remarke as MSS.

Investigation of UV peak and making of standarization curve: The UV intake peak of the MSS after solve in (12, 24 and 36 mgL-1for hexane, (45 and 65) mgL-1for CH₂ Cl₂) was specified by scanning wavelength (230 nm- 250 nm for hexane) and (from 190 nm to 210 nm for CH₂ Cl₂) using UV-visible spectrometer (Optima Nano 6000, Japan).

Determination of recall analysis: An impurity samples was mixed with various types of standards to profit the impurity soils with various standard concentrations (150, 300, 3000, 6000 and 9000 mg kg⁻¹) of MSS. Thus, the recovery was counted by the below equation:

$$\text{Recovery (\%)} = (R-B) \times 100 / P$$

Where, S was the Real amount determined (mg kg⁻¹), B was the amount in the blank (mg kg⁻¹), P was the standard concentration prepared (mg kg⁻¹). All Steps for determination and Extraction of MSS are applied here.

RESULTS AND DISCUSSION

Samples were examined are control from agriculture sites and contaminated samples that graduated from

heavily pollution to light according to distance from pollution sources. As we show from (Fig. 1). The peak of MMS was very fitted to each other (Square root = 0.996) and that mean the method that use in this study for preparation Mixture of Standard Sample (MSS) is very effective because that depend on the saturated oil (hydrocarbons) in the soil and major hard for qualitative and quantitative tests of mixture contaminated soils^[16].

Total Petroleum Hydrocarbon pollutants is also inadequate for the estimate of danger, produce from the existence of pollution at the specific areas. Since, it is often an undefined mixture of compounds, it is not possible to specify migration capabilities of the given pollution and not at all to determine its toxicological characteristics. Resulting from the nature of TPH analysis, it is not possible to distinguish the quality of pollution, i.e., the toxicity of such pollution cannot be determined. The Total Petroleum Hydrocarbons tests can screen anyone from the occurrence of slender value of common complex to single -kind impurity by benzene.

TPH contamination should rather be evaluated as contents of individual specific compounds (e.g., individual aromatic or polyaromatic hydrocarbons) or as particular qualitative types in case that their physical, chemical and toxicological properties are known. From this point of view, it is necessary to focus more on the methodology of estimation of risks caused by contamination by actual fuels and greases^[17].

Figure 2 Explain the concentration of some sample that examined after preparation of standard curve at UV spectrophotometer by scanned the wave length within a range and after the scan the exactly wave length determined^[18].

The link from the concentrations of MSS and identical UV light fit a linear connection as specified

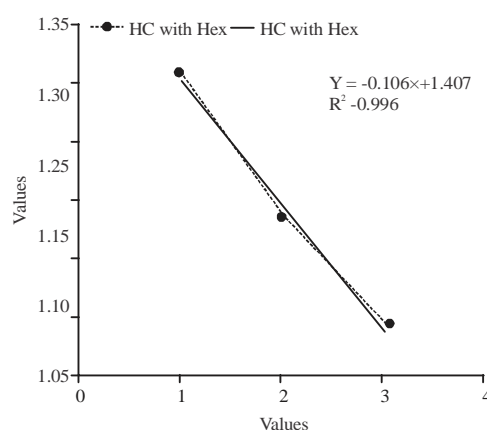


Fig. 1: Standard curve

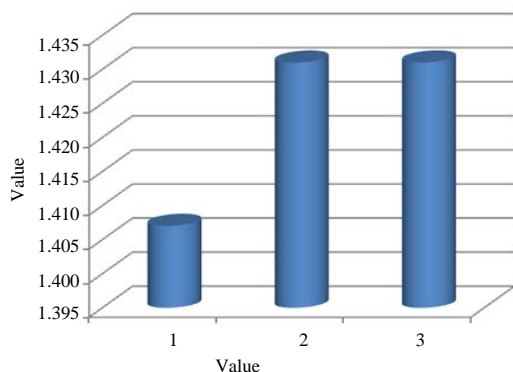


Fig. 2: The samples concentration during the study

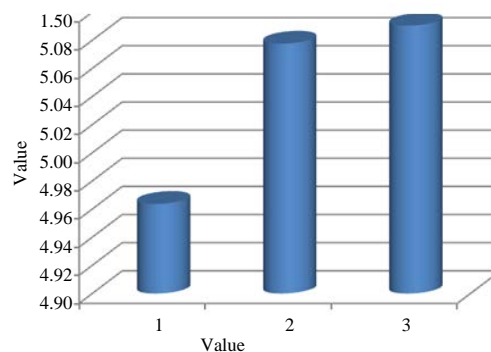


Fig. 4: The samples concentration during the study

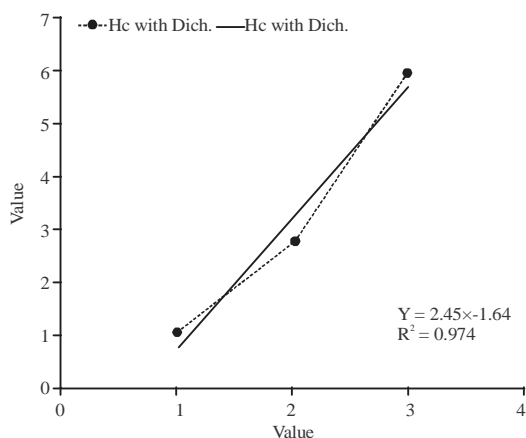


Fig. 3: Standard curve

by the big connection degree for each solvents, CH_2Cl_2 ($r = 0.9977$) and hexane ($r = 0.996$). The mentioned results obviously that the UV spectroscopy is a effectively path to examination the amount of petroleum contaminated soil. However, procedure precision was necessary to be examined in the existant of SOM and field of recapture^[19] (Fig. 3 and 4).

It was explain that the intake tip was constant at 240 and 210 nm for the MSS solved in CH_2Cl_2 and hexane. The increase of Hydrocarbons contents lead to a powerful absorption rate, whose about harmonious with the top absorption wavelength of petroleum hydrocarbons.

After recovery method that use to tested this method established and the results were: (85,101,125%) and (97,115 and 177%) for Hexane and Dichloro, respectively. However, the basis for this procedure exhibit that the CH_2Cl_2 extraction show to be more better than the hexane extraction according to less than levels from 85-125% for the previous while diverse from 97-177%. Commonly, the preceding methods show a typical repeatability and accuracy and had a decrease sample tests time^[20].

CONCLUSION

The mentioned results obviously that the UV spectroscopy is a effectively path to examination the amount of total hydrocarbon in the soil.

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