

TPH Method 418.1

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Introduction

What is TPH method 418.1?

Total Petroleum Hydrocarbons method 418.1

It is defined as the measurable amount of petroleum based hydrocarbons in an environmental media. Since it is a measured, gross quantity without identification of its elements, the TPH value is still a mixture. Therefore, TPH is not a direct risk to humans and the environment.

Fuels deriving from petroleum are complex mixtures of organic compounds, in general hydrocarbons, with wavering compositions depending on source of the crude oil and its refining process. The chemical characteristics of these fuels can deviate between different brands and grades of fuel and depending on geographical regions, commercial source, and season.

Problem

What is the best and cheapest way to decontaminate highly hydrocarbon-contaminated soils?

Abstract

This project is designed to show the importance of TPH method 418.1 and to find the best and cheapest way to decontaminate a large area that is highly contaminated with petroleum hydrocarbons; currently the solvent being used for this procedure is Freon. The soils being analyzed in this experiment are samples from specified clients. The clients' information is considered confidential and is not to be made available to other parties without the express written consent of ETL. The EPA requires this test periodically. Many of our clients are in the process of building. So, our samples are mostly from construction sites.

In order to calculate the results to the TPH method 418.1 tests a previous test is required on the same samples, Total Solids. The procedure is as follows:

1. Weigh an aluminum dish and record the weight in the computer as, dish weight.

****Each aluminum dish must be labeled with the correct custody number of each client.

2. Tare the scale

3. Weigh approximately 10 grams of the soil sample into the aluminum dish, record in the computer as wet weight.

- Do so for each sample.

4. Then place the weighed samples in the oven for 2 hours at a temperature of 103-105 degrees Celsius.

5. Take the dishes out of the oven.

6. Weigh them again and record in computer as dry weight.

TS is calculated as follows :(results are reported in %)

$$\text{mg total solids/L} = \frac{(A-B) \times 100}{C}$$

C

Where:

$A = \text{dry weight of sample} + \text{dish weight in mg}$

$B = \text{weight of dish in mg}$

$C = \text{wet weight}$

Materials

- Soil Samples
- Wooden/metal spatula
- Weighing digital scale
- Computer
- VOA
- Graduated cylinder
- Freon
- Mixture of silica gel and sodium sulfate
- Scoop- used to add the mixture of silica gel and sodium sulfate to samples.
- Sonicator
- Glass pipette
- Florosil

- Glass wool
- Plastic Bulb
- Spectrophotometer
- Spectrophotometric Cuvette

Methods

TPH Method 418.1

1. Weigh approximately 10 grams of soil into a clean glass

VOA

Blank 10 grams of sand

MS "

MSD "

2. Add 3 scoops (grams) of a mixture of sodium sulfate and silica gel to each VOA

**the mixture of sodium sulfate and silica gel is added to the samples in order to take out any excess water/ moisture in the samples.

3. Add 20 ml of Freon to each VOA

4. Spike the MS and the MSD with .2 ml of 10,000-PPM TPH matrix spike solution.
5. Sonicate the sample for 20 minutes
6. After sonicating each sample let it cool for about 15 minutes or so
7. Filter each sample through a prepared glass pipette with florossil and glass wool into the spectrophotometer cuvette
8. Place in the spectrophotometer to get absorbance reading.
9. Calculate the results using Microsoft Excel or the following formula: $Y = ax + b$

$$Y = 979.48(\text{abs}) + 7.8447 = \text{Concentration } \mu\text{g/mL}$$

$$A = 9.79.48 \quad x = \text{absorbance reading} \quad b = 7.8447$$

$$\frac{\text{Concentration } \mu\text{g/mL} * \text{Volume in ml}}{\text{Weight in grams}} = \text{final concentration (PPM)}$$

Results

27 samples were analyzed. Here are the results:

COC	VOL	WEIGHT	ABS	TS	Ug/mL	mg/kg
0506408-3	20	10.48	0.038	0.985	28.89	55.98
0506408-5	20	10.09	0.01	0.944	13.80	28.98
0506408-5DUP	20	10.09	0.009	0.944	13.17	27.66
0506408-6	20	10.19	0.037	0.886	30.78	68.18
0506414-1	20	10.69	0.722	0.833	461.42	1036.35
0506414-2	20	10.63	0.789	.829	503.54	1142.83
0506414-3	20	10.26	0.639	0.848	409.24	940.74
0506492-2	20	10.62	0.012	0.748	15.06	37.92
0506492-3	20	10.55	0.207	0.893	137.65	292.22
0507078-2	20	10.62	1.036	0.898	658.83	1381.66
0507080-2	20	10.20	0.556	0.911	357.06	768.52
0506470-2	20	10.68	0.026	0.792	23.86	56.42
0506470-3	20	10.07	0.024	0.828	22.60	54.22
0506470-4	20	10.96	0.031	0.704	27.01	70.00
0506470-5	20	10.48	0.044	0.847	35.18	79.26

0506470-7	20	10.22	0.026	0.865	23.86	53.98
0506470-8	20	10.98	0.07	0.878	51.52	106.89
0506470-9	20	10.08	0.081	0.82	58.44	141.40
0507087-1	20	10.07	0.136	0.822	93.02	224.74
0507087-2	20	10.04	1	0.761	636.20	1665.34
0507088-1	20	10.61	0.001	0.906	8.14	16.95
0507088-2	20	10.80	-.007	0.874	3.12	6.60
BLANK	20	10.55	0	1	7.52	14.25
BLANK MS	20	10.84	0.218	1	144.57	266.73
BLANK MSD	20	10.82	0.217	1	143.94	266.06

KEY:

First column - custody number of the client

Second column - volume of Freon used

Third column - weight of soil

Fourth column - absorbance reading

Fifth column - Total solids percentage

Sixth column - Sample concentration

Seventh column - Final concentration

Conclusion

This is an ongoing research, so results are not yet available.

Future work

Uncontaminated soils will be contaminated with petroleum hydrocarbons and new methods will be used to try to find the best and cheapest way to decontaminate highly contaminated soils.

Glossary

EPA: Environmental Protection Agencies

TPH: Total Petroleum Hydrocarbons

TS: Total Solids

PPM: Parts Per Million

Blank MS: Matrix Spike

Blank MSD: Matrix Spike Duplicate

Spectrophotometer: An instrument used to determine the intensity of various wavelengths in a spectrum of light.

VOA: A glass tube with a plastic screwing top.

Solvent: A substance capable of dissolving another substance

Freon: nonflammable gaseous liquid

Sodium Sulfate: a white crystalline compound used as a mild natural laxative and in larger doses as a hydro gauge cathartic.

Silica gel: a porous form of silica that is highly absorbent

References

SOP

Title: Total solids, dried at 103-105 degrees Celsius
Prepared By: Vanessa Lewis
Prepared date: 8/14/03
Revision: Original
Reviewed by: Patricia Werner-Els Date: 2/11/04
Approved by: Juan R. Cuba Date: 4/12/04

SOP

Title: TPH 418.1
Prepared by: Vanessa Lewis

Lab Safety Procedures

www.dictionary.reference.com

www.phaseonline.com

Environmental Handbook

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