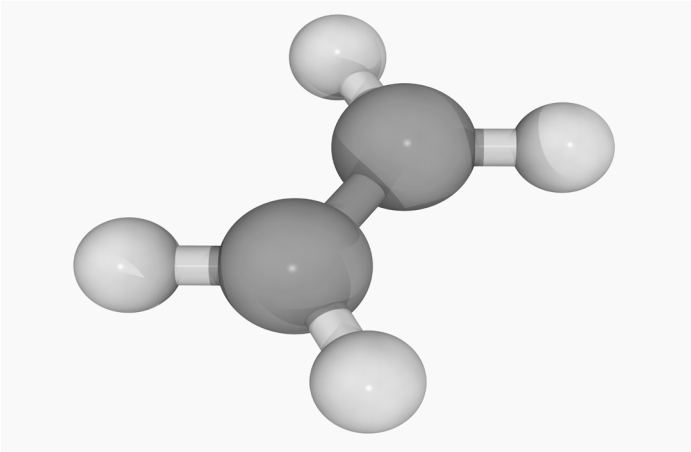
Fractionation of Aliphatic And Aromatic Hydrocarbons Using ENVIRO-CLEAN® EPH SILICA



UCT Part Numbers

XRSIHT13M15
(Enviro-Clean® EPH Fractionation
3000 mg/15 mL)

Summary:

The composition of petroleum is a complex mixture of hundreds of different hydrocarbon compounds. The resultant makeup of hydrocarbons released into the environment is variable and dependent on the conditions to which it is subsequently exposed. While in the environment, petroleum composition is influenced by a number of factors including volatilization, leaching, and/or biological degradation. These environmental effects yield a mixture whose toxicological properties can be vastly different than the parent product. Based on the known toxicological properties of petroleum products we can assume that:

- aromatic compounds are more toxic than aliphatic compounds
- the toxicity of aliphatic compounds is dependent upon their molecular weight with low molecular weight compounds showing relatively higher toxicity

The fractionation of the total petroleum hydrocarbon extract is necessary to determine the concentration of the aliphatic versus aromatic compounds. The Massachusetts Department of Environmental Protection (MADEP) has taken the approach of fractionating the C9-C18 aliphatics (n-nonane to n-octadecane), C19-C36 aliphatics (nnonadecane to hexatriacontane), and the C11-C22 aromatics (naphthalene to benzo (g,h,i)perylene). These compounds are associated with the release of hydrocarbons in the environment. The aromatics are considered the most toxic form of hydrocarbon.

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Procedure:

1. Prepare Extract

a) Solvent exchange the hydrocarbon extract from methylene chloride to hexane using a K-D apparatus.

2. Prepare Cartridge

a) Thoroughly rinse cartridge with two, 10 mL aliquots of pentane.
b) Add 1 mL of the extract to the cartridge.
c) Elute aliphatic fraction with pentane by gravity and collect everything in an ampoule. About 10 mL* should be collected.
d) Place a fresh ampoule under the cartridge and elute the aromatic fraction with methylene chloride by gravity. About 10 mL** should be collected.
e) Concentrate each fraction separately to a final volume on a steam bath using an ampoule and micro-Snyder column combination. Other techniques may be used but the loss of C9-C18 hydrocarbons may result.

It is very important to keep the silica cartridges dry and away from room air prior to use. Moisture and contaminants in the air will reduce the effectiveness of the silica and may cause contamination of the extract. Pre-rinsing the cartridges with acetone may reduce this problem.

Results

Classification	Range	Percent Recovery
Aromatics	**C11-C22**	**88**
surrogates	2-fluorobiphenyl	**123**
surrogates	o-terphenyl	**100**
Aliphatics	**C9-C18**	**85**
	C19-C36	**89**
surrogates	1-chlorooctadecane	**58**

MA EPH DATA from Lancaster Labs*

* Pentane volume should be optimized with aliphatics being eluted only.
** Methylene Chloride volume should be optimized for aromatics elution.

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