ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

ENVIROMAIL # 29

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What Volatile Organic Compounds (VOCs) do I get reported in my ALS 'TPH' C6-C9 Analysis fraction?

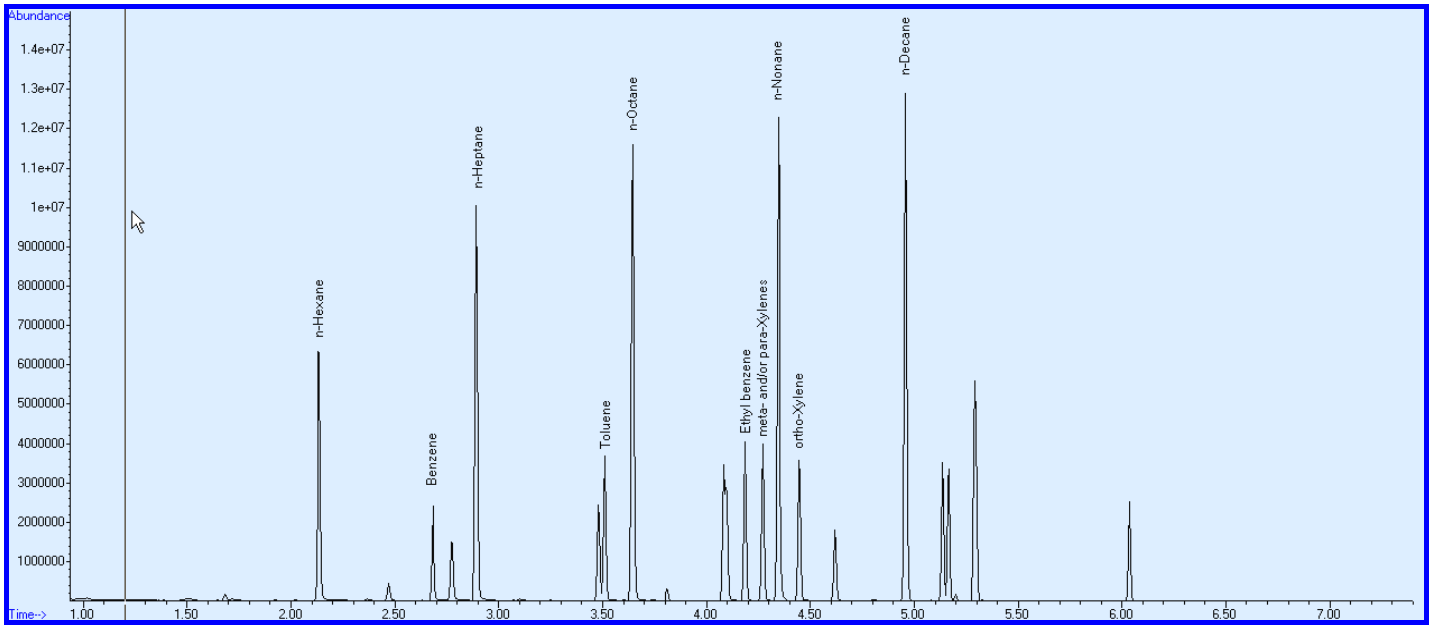
'TPH' (C6-C9) or 'TRH' (C6-C9) is an analysis commonly used for both screening samples for potential contamination and also to assess against specific guidelines. In interpreting these results, it is important to understand how the GC/MS Purge and Trap method is performed by your laboratory, as different laboratories have subtle differences in reporting, which can create variations in results.

General 'TPH' Carbon Banding in Australia – Volatiles and Semi volatiles

The first thing to understand is that at ALS, the Equivalent Chain Length (ECL) for n-alkanes is used nationally to define the points on which carbon banding is based. This is further defined as the retention time of a compound on a GC column relative to number of carbons in an n-Alkane chain length. For example, this means that if the boiling point of a compound is less than that of n-heptane (C7) that compound can only show up in the 'TPH' banding at less than C7. ***The key point to note is that it is the boiling point rather than the number of Carbon atoms that defines which carbon band the compound will report in.***

With 'TPH' bands (C6-C9, C10-C14, C15-C28, C29-C36), the boundary definition deemed appropriate by ALS is the mid-point between adjacent n-alkanes. This is used for volatile and (logically) semi-volatile fractions. This sees compounds eluting from a retention time midway between C5 & C6 up to and including midway between C9 & C10 reporting in the C6-C9 fraction. Another way of thinking of this is that ALS C6-C9 is actually C5.5 to C9.5. This approach is consistent with the TPH C10-C36 semi-volatile fraction rules and ensures that a compound with a boiling point between fractions e.g. between C9 and C10 will be captured in one fraction and will not be missed (e.g. See ortho-Xylene in the following chromatogram).

Chromatogram with n-alkane 'markers' plus BTEX compounds.



Right solutions….
….Right partner

Is it safe for me to use TPH C6-C9 to screen for VOCs?

This is really a decision for you based upon your knowledge of likely contaminants and your objectives. The key point here is that some Volatile Organic Compounds (VOCs) as reported under the USEPA 8660 VOC method will actually not report in the C6-C9 fraction and therefore care is needed. The following table shows the ALS reported VOCs under ALS method EP074 (reference method USEPA 8260) and utilising the ALS rules for the calculation of Carbon Banding. This table also highlights whether individual compounds report to the TPH C6-C9 fraction.

ALS FULL VOC USEPA 8260 Listing **EP074A: Monocyclic Aromatic Hydrocarbons**	**Does the compound report to the ALS TPH C6-C9 band?**
Benzene, Toluene, Ethylbenzene, meta-, para & ortho-xylene, Styrene, Isopropylbenzene	**Yes**
n-Propylbenzene, 1.3.5-Trimethylbenzene, sec-Butylbenzene, 1.2.4-Trimethylbenzene, tert-Butylbenzene, p-Isopropyltoluene, n-Butylbenzene	**No – These report to greater than the C6-C9 band, i.e. after C9.5**
EP074B: Oxygenated Compounds	
2-Propanone (Acetone)	**No – This reports to less than the C6-C9 band, i.e. before C5.5**
Vinyl Acetate, 2-Butanone (MEK), 4-Methyl-2-pentanone (MIBK), 2-Hexanone (MBK), Methyl t-butyl ether	**Yes**
EP074C: Sulfonated Compounds	
Carbon disulfide	**No (as per 2-Propanone above)**
EP074D: Fumigants	
2.2-Dichloropropane, 1.2-Dichloropropane, cis-1.3-Dichloropropylene, trans-1.3-Dichloropropylene, 1.2-Dibromoethane (EDB)	**Yes**
EP074E: Halogenated Aliphatic Compounds	
Dichlorodifluoromethane, Chloromethane, Vinyl chloride, Bromomethane, Chloroethane, Trichlorofluoromethane, 1.1-Dichloroethene, Iodomethane, Methylene chloride	**No – These report to less than the C6-C9 band, i.e. before C5.5**
trans-1.2-Dichloroethene, 1.1-Dichloroethane, cis-1.2-Dichloroethene, 1.1.1-Trichloroethane, 1.1-Dichloropropylene, Carbon Tetrachloride, 1.2-Dichloroethane, Trichloroethene, Dibromomethane, 1.1.2-Trichloroethane, 1.3-Dichloropropane, Tetrachloroethene, 1.1.1.2-Tetrachloroethane, trans-1.4-Dichloro-2-butene, cis-1.4-Dichloro-2-butene, 1.1.2.2-Tetrachloroethane, 1.2.3-Trichloropropane	**Yes**
Pentachloroethane, 1.2-Dibromo-3-chloropropane, Hexachlorobutadiene	**No – These report to greater than the C6-C9 band, i.e. after C9.5**
Bromochloromethane	**Yes**
EP074F: Halogenated Aromatic Compounds	
Chlorobenzene	**Yes**
Bromobenzene, 2-Chlorotoluene, 4-Chlorotoluene, 1.3-Dichlorobenzene, 1.4-Dichlorobenzene, 1.2-Dichlorobenzene, 1.2.4-Trichlorobenzene, 1.2.3-Trichlorobenzene	**No – These report to greater than the C6-C9 band, i.e. after C9.5**
EP074G: Trihalomethanes	
Chloroform, Bromodichloromethane, Dibromochloromethane, Bromoform	**Yes**
EP074H: Naphthalene	
Naphthalene	**No – This reports to greater than the C6-C9 band, i.e. after C9.5**

For further information on specific compounds and where they may report, please feel free to contact the ALS Technical Manager or your local ALS team.

Adelaide	Brisbane	Mackay	Melbourne	Newcastle	Perth	Sydney	Townsville
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