

Solvent Selection Guide for InfraCal 2 TOG/TPH Analyzers

Since the Montreal Protocol banned the production of Freon-113, it became necessary to find a suitable replacement solvent or solvents for measuring total oil and grease (TOG) and total petroleum hydrocarbon (TPH) levels in water and soil using infrared analysis. We studied potential candidates for Freon replacement and found several that are usable. In addition, ASTM approved S-316 as a replacement solvent for Freon-113 (Method D 7066-04). The characteristics of these solvents are described below. Please note, there are other infrared transmitting solvents that can be used for TOG/TPH analyses.



	PERCHLOROETHYLENE	S-316	HEXANE	PENTANE	VERTREL
Recommended Grade Purity	99+% Hydrocarbon Free	NA	95+%	95+%	MCA
Extraction Efficiency	87%	98%	98%	98%	95%
Infrared Method	Transmission	Transmission	ATR/Evaporation	ATR/ Evaporation	ATR/Evaporation
Boiling Point (°C)	121	134	69	36	39
Recommended Drying Time (minutes)	N/A	N/A	3:00 - 5:00*	2:00 - 4:00*	3:00 - 5:00*
Includes/Loses Volatile Components	Includes	Includes	Loses	Loses	Loses
Recommended Infracal Model(s)	TRANS-SP, CVH	TRANS-SP, CVH	ATR-SP, HATR-T2, CH	ATR-SP, HATR-T2, CH	ATR-SP, HATR-T2, CH
Approved or Screening Method	Screening equivalent to EPA 413.2/418.1	Approved ASTM Method D 7066-04 Screening equivalent to EPA 413.2/418.1	Screening correlates to EPA 1664	Screening correlates to EPA 1664	Screening correlates to EPA 1664

For Use with Model TRANS-SP & CVH

Tetrachloroethylene (Perchloroethylene)

A moderately volatile non-hydrocarbon solvent that is being used as a replacement for Freon-113. Many grades are stabilized with hydrocarbons that make them unsuitable for TOG and TPH analysis. Hydrocarbon-free, spectroscopic grades are available which make them usable for analysis by IR transmission methods. Since its heavier than water, the solvent after extraction will be on the bottom. Presently accepted as a Freon replacement in the UK.

NOTE: The only suitable spectroscopic grade of tetrachloroethylene is manufactured by JT Baker "Tetrachloroethylene Ultra Resi-analyzed."[®]

Please check our website for detailed specifications

S-316 A proprietary, non-hydrocarbon solvent said by its manufacture to be environmentally safe. Since S-316 is heavier than water, the solvent after extraction will be on the bottom. Because of its transparency in the C-H region, it can be used with a 10mm cuvette. It is a recommended and approved replacement solvent for Freon – ASTM Standard Test Method D 7066-04.

For Use with Model ATR-SP, HATR-T2 & CH

Hexane A volatile hydrocarbon that is specified for EPA Method 1664. Because it is a hydrocarbon, it must be evaporated prior to making the infrared measurement to determine TOG or TPH levels in a sample, which takes approximately 3-5 minutes. Since hexane is lighter than water, the solvent, after extraction will rest on top, making it easy to deliver a measured amount of extract to the sample platform or plate with a 60 µl auto pipette without losing any of the sample.

Pentane A volatile hydrocarbon preferred in Scandinavian countries over hexane. Similar in performance and use to hexane, although it has a lower boiling point, and therefore will retain more of the low boiling point components. Pentane is lighter than water and like hexane will rest on top after the extraction.

Vertrel MCA A volatile HFC solvent that has been used primarily as a replacement solvent for Freon in cleaning operations. Because of its hydrocarbon absorption, like hexane it must be evaporated prior to making the infrared measurement to determine TOG or TPH levels. Vertrel MCA is a suitable solvent to use instead of hexane. Vertrel MCA has no ozone depleting potential, is non-flammable and has low toxicity. As Vertrel MCA is heavier than water, the solvent after extraction will rest on the bottom. A microliter glass pipette can be used when preparing a sample; however, because of the weight of Vertrel, the extract should be delivered to the sample platform or plate with a 50 µl syringe, rather than a pipette for analysis.