

**SOLVENT SELECTION GUIDE
FOR INFRACAL TOG/TPH
ANALYZERS**

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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. Wilks Enterprise studied potential candidates for Freon replacement and have 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, along with those of Freon-113 are described below. Please note, there are other infrared transmitting solvents that can be used for TOG/TPH analyses.

	Freon-113	Perchloro-ethylene	AK-225	S-316	Hexane	Pentane	Vertrel
Recommended Grade Purity	99+%	99+% Hydrocarbon Free	99+%	N/A	95+%	95+%	MCA
Extraction Efficiency	91%	87%	88%	98%	98%	98%	95%
Infrared Method	Transmission	Transmission	Transmission	Transmission	ATR/ Evaporation	ATR/ Evaporation	ATR/ Evaporation
Boiling Point (°C)	48	121	54	134	69	36	39
Recommended Drying Time (minutes)	N/A	N/A	N/A	N/A	3:00 - 5:00*	3:00 - 5:00*	3:00 - 5:00*
Includes/Loses Volatile Components	Includes	Includes	Includes	Includes	Loses	Loses	Loses
Recommended Infracal Model(s)	CVH	CVH	CVH	CVH	HATR-T2, CH	HATR-T2, CH	HATR-T2, CH
Approved or Screening Method	Approved EPA 413.2/418.1	Screening Equivalent to EPA 413.2/418.1	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

VARIOUS SOLVENTS

FOR USE WITH MODEL CVH

FREON-113 A volatile CFC compound previously specified for EPA Methods 413.2 and 418.1. While its manufacture has been discontinued, its use was extended by the EPA and it is still readily available in many parts of the world. Since it is heavier than water, the solvent after extraction will be on the bottom. Because of its infrared transparency, it can be used with a 10mm cuvette cell. Freon is ideal for applications requiring the measurement of light ends, as well as, the heavier components in water and soil samples.

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.

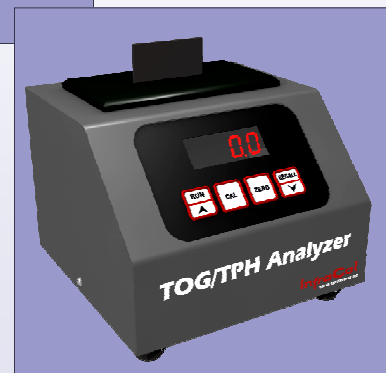
Presently accepted as a Freon replacement in the UK.

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

Please check our website for detailed specifications.

AK-225 A volatile HCFC solvent that nevertheless has low ozone depletion efficiency. It can be used as a replacement solvent for Freon-113. However, because of absorption in the C-H region, it has lower sensitivity than Freon-113 but is still usable for analysis by transmission methods. AK-225 is heavier than water and, therefore, the solvent after extraction will be on the bottom. At the lower concentration ranges, some method of moisture removal such as sodium sulfate may be required.

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 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 50 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.