Oil in water analysis

ISO 9377-2 / 9377-2 MOD

ISO 9377-2: Hydrocarbon oil index

The method of choice for the determination of oil and grease in water is the new standard ISO 9377-2, and is based on extraction with a hydrocarbon solvent like pentane or hexane.

This test determines the hydrocarbon oil index in water by means of gas chromatography. The method is suitable for surface water, waste water, and water from sewage treatment plants, and allows the determination of the hydrocarbon oil index in concentrations above 0.1mg/L.

The index is the sum of compounds with retention times between *n*-decane and *n*-tetracontane. Substances complying with this definition are long-chain or branched aliphatic, alicyclic, aromatic or alkylsubstituted aromatic hydrocarbons.

For the determination of mineral-oil content of soils and sediments, see ISO/TR 11046.

ISO 9377-2-Mod: Determination of hydrocarbons oil index down to C7

A modified method for oil in water analysis of produced water from offshore petroleum production installations has recently been taken into force.

ISO 9377-2 is not applicable for volatile hydrocarbons, and a modification of the method is proposed by the OSPAR commission in order to include the determination of certain hydrocarbons with boiling points between 98 and 174 ºC from produced water.

The OSPAR Reference Method of Analysis for the Determination of the Dispersed Oil Content in Produced Water: *Reference Number 2005-15*.

PRODUCT OVERVIEW:

Description of standard	ISO 9377-2	ISO 9377-2 MOD	Alternative products
Mixture of mineral oils	S-4215	S-4215	
Calibration mixture of mineral oils	S-4216	S-4216	S-4451 (with BAM-K10)
Quality control standard of mineral oils A+B	S-4217	S-4217	S-4453 (with EDC oil)
Extraction solvent stock solution I	S-4212	S-4415	S-4422 (40 µg/mL)
Extraction solvent standard solution (ready to use)	S-4515	S-4516	
Stearyl stearate test solution	S-4134	S-4517	
Test for suitability of fluorisil	S-4213	S-4518	
Stearyl stearate solution for comparison	S-4214	S-4519	
Standard mixture of *n*-alkanes, all even	S-4108 (C10-C40) S-4107 (C20-C40)	S-4278	
Standard mixture of BTEX		S-4257 S-4218 S-4400	
Standard mixture of *n*-alkanes and BTEX			S-4423 S-4424 S-4395

ISO 9377-2 Standards available from Chiron for the determination of hydrocarbon oil index

S-4215-1ML **ISO 9377-2 Mixture of Mineral Oils A+B Without Additives**
Mixture 1:1 (neat), 1x1 mL, 5x1 mL
Type A: Diesel fuel without additives
Type B: Lubricant oil without additives

S-4216-SET **ISO 9377-2 Calibration Mixture of Minerals Oils**
Mineral oils (S-4215) in pentane, set of 6x5 mL
Blank/200/400/600/800/1000 ug/mL

S-4217-K-AC **ISO 9377-2 Quality Control Standard of Mineral Oils A+B**
1000 µg/mL in acetone (500 µg/mL of each A and B), 1x1 mL, 5x1 mL, 10x1 mL
S-4217-4K-AC 4000 µg/mL in acetone (2000 µg/mL of each A and B), 1x1 mL, 5x1 mL, 10x1 mL
S-4217-10K-AC 10000 µg/mL in acetone (5000 µg/mL of each A and B), 1x1 mL, 5x1 mL or 10x1 mL

S-4453-4K-AC **ISO 9377-2 MOD Quality Control Standard of Base Oil EDC 95/11**
4000 µg/mL in acetone, 1x1 mL, 5x1 mL, 10x1 mL

S-4212-20-5PE **ISO 9377-2 Extraction Solvent Stock Solution I**
S-4212-20-20PE Units: 1x5 mL, 5x5 mL, 10x5 mL, 1x20 mL, 5x20 mL, 10x20 mL, 1x100 mL and 5x100 mL
S-4212-20-100PE

n-Decane	20 µL
n-Tetracontane	20 mg
Pentane	Add to 1000 mL

S-4515-2-50PE **ISO 9377-2 Extraction Solvent Standard Solution**
This item is solution S-4212-20-PE diluted 10 times with the extraction solvent (Pentane)
Units: 1x50 mL, 5x50 mL, 10x50 mL.
Ready to use: Use 50 mL of this solution in each experiment.

S-4134-2K -10MX **ISO 9377-2 Stearyl Stearate Test Solution**
Units: 1x10 mL, 5x10 mL, 10x10 mL

Stearyl stearate	200 mg
Extraction solvent standard solution (S-4515)	100 mL

This solution is used to check the efficiency of the clean-up procedure.

S-4213-800-25MX **ISO 9377-2 Test for Suitability of Fluorisil**
S-4213-800-100MX Test with stearyl stearate to determine the separation of polar compounds

Stearyl stearate test solution, 2 mg/mL (S-4134-ASS)	10 mL
Extraction solvent (*n*-Pentane)	15 mL

Units: 1x25 mL, 5x25 mL, 10x25 mL, 1x100 mL
Ready to use: A total of 25 mL of this solution to be used in each experiment

S-4214-40-PE **ISO 9377-2 Stearyl Stearate Solution for Comparison**
Units: 1 mL, 5x1 mL, 10x1 mL, for direct GC-comparison

Stearyl stearate test solution, 2 mg/mL (S-4134)	0.5 mL
Extraction agent (Pentane)	24.5 mL

S-4108-50-PE* **ISO 9377-2 Standard Mixture of *n*-Alkanes C10-C40 (all even) (*n*-Alkanes – Mix 7)**
Determination of Hydrocarbon Oil in Water Index
16 Analytes, each 50 µg/mL in *n*-Pentane, Units, 1x1mL, 5x1mL or 10x1 mL

S-4108-100-CY* This standard is also available as 100 µg/mL in Cyclohexane in Certan bottle
Units: 1x1 mL, 5x1 mL, 10x1 mL

S-4107-50-PE* **ISO 9377-2 Standard Mixture of *n*-Alkanes C20-C40 (all even) (*n*-Alkanes – Mix 6)**
S-4107-50-HX* Determination of Hydrocarbon Oil in Water Index
11 Analytes, each 50 µg/mL in *n*-Pentane or *n*-Hexane; units: 1x1 mL, 5x1 mL, 10x1 mL

*When using the above standards to check column performance, the relative ratio *n*-Tetracontane to *n*-Eicosane should be at least 0.8

ISO 9377-2-Mod: Standards available from Chiron for the determination of hydrocarbon oil index down to C7

S-4215-1ML **ISO 9377-2 Mixture of Mineral Oils A+B Without Additives**
See above for ISO 9377-2

S-4216-SET **ISO 9377-2 Calibration Mixture of Minerals Oils**
See above for ISO 9377-2

S-4453-4K-AC **ISO 9377-2 MOD Quality Control Standard of Base Oil EDC 95/11**
4000 µg/mL in Acetone, Units: 1x1 mL, 5x1 mL, 10x1 mL

S-4217-K-AC **ISO 9377-2 Quality Control Standard of Mineral Oils A+B**
1000 µg/mL in acetone (500 µg/mL of each A and B), 1x1 mL, 5x1 mL, 10x1 mL
S-4217-4K-AC 4000 µg/mL in acetone (2000 µg/mL of each A and B), 1x1 mL, 5x1 mL, 10x1 mL
S-4217-10K-AC 10000 µg/mL in acetone (5000 µg/mL of each A and B), 1x1 mL, 5x1 mL or 10x1 mL

S-4415-20-5PE **ISO 9377-2 MOD Extraction Solvent Stock Solution I**
S-4415-20-100PE Units: 1x5 mL, 5x5 mL, 10x5 mL, 1x100 ml and 5x100 mL

n-Heptane	20 µL (instead of *n*-Decane in the original method, S-4212)
n-Tetracontane	20 mg
n-Pentane	Add to 1000 mL

S-4516-2-50PE **ISO 9377-2 MOD Extraction Solvent Standard Solution.**
This item is solution S-4415-20-PE diluted 10 times with the extraction solvent (*n*-Pentane)
Units: 1x50 mL, 5x50 mL, 10x50 mL.
Ready to use: Use 50 mL of this solution in each experiment.
(See S-4515-2-50PE for the original method)

S-4517-2K-10MX **ISO 9377-2 MOD Stearyl Stearate Test Solution**
Units: 1x10 mL, 5x10 mL, 10x10 mL

Stearyl stearate	200 mg
Extraction solvent standard solution (S-4516)	100 mL

This solution is used to check the efficiency of the clean-up procedure.
(See S-4134 for the original method)

S-4518-800-25MX **ISO 9377-2 MOD Test for Suitability of Fluorisil**
S-4518-800-100MX Test with stearyl stearate to determine the separation of polar compounds
Stearyl stearate test solution, 2 mg/mL (S-4517-ASS) 10 mL
Extraction solvent (*n*-Pentane) 15 mL
Units: 1x25 mL, 5x25 mL, 10x25 mL, 1x100 mL
Ready to use: A total of 25 mL of this solution to be used in each experiment
(see S-4213-800-25/100MX for the original method)

S-4519-40-PE **ISO 9377-2 MOD Stearyl Stearate Solution for Comparison**
Unit: 1 mL, 5x1 mL, 10x1 mL for direct GC-comparison
Stearyl stearate test solution, 2 mg/mL (S-4517) 0.5 mL
Extraction agent (*n*-Pentane) 24.5 mL
(See S-4214 for the original method)

S-4422-100-4.5PE **ISO 9377-2 MOD Extraction Solvent Stock Solution II**
S-4422-100-100PE Units: 1x4.5 mL, 5x4.5 mL, 10x4.5mL, 1x100 mL and 5x100 mL extraction solvent stock solution
n-Heptane 40 mg
n-Tetracontane 40 mg
Pentane Add to 1000 mL

S-4257-200-ME **BTEX Mix 1, Methanol**
S-4257-200-5ME 6 Analytes, each 200 µg/mL in Methanol, Units: 1x1 mL, 1x5 mL, 1x10 mL
S-4257-200-10ME Benzene *o*-Xylene
Toluene *m*-Xylene
Ethylbenzene *p*-Xylene

S-4257-200-PE BTEX Mix 1, Pentane
S-4257-200-5PE 6 Analytes, same mix as above, each 200 µg/mL in methanol, Units: 1x1 mL, 1x5 mL, 1x10 mL

S-4218-2K-ME **BTEX Mix 2, Methanol**
S-4218-2K-5ME 6 Analytes, same mix as above, each 2000 µg/mL in Mathanol, Units: 1x1 mL, 1x5 mL

S-4218-2K-PE BTEX Mix 2, Pentane
S-4218-2K-5PE 6 Analytes, same mix as above, each 2000 µg/mL in Pentane, Units: 1x1 mL, 1x5 mL

S-4400-10-2ME **BTEX Mix 8 (without ethylbenzene)**
5 Analytes, each 10 µg/mL in methanol, 1x2 mL or 5x2 mL screwcap bottle
Benzene *o*-Xylene
Toluene *m*-Xylene
p-Xylene

S-4278-50-PE **ISO 9377-2 MOD Standard Mixture of *n*-Alkanes**
S-4278-50-5PE **C7+C8+C9+C10-C40 (all even) (*n*-Alkanes – Mix 23)**
19 Analytes; each 50 µg/mL in *n*-Pentane; Units: 1x1 mL, 5x1 mL, 10x1 mL (Certan bottle)
S-4278-100-CY Also available as 100 µg/mL in Cyclohexane; Units: 1x1 mL, 5x1 mL, 10x1 mL, 1x5 mL
S-4278-100-5CY

S-4423-50-PE **ISO 9377-2 MOD Standard Mixture of**
S-4423-50-5PE **C7+C10+ C20+C40+BTEX (*n*-Alkanes+BTEX – Mix 1)**
Determination of Hydrocarbon Oil in Water Index
12 Analytes; each 50 µg/mL in *n*-Pentane; Units: 1x1 mL, 1x5 mL, 10x1 mL

S-4424-50-PE **ISO 9377-2 MOD Standard Mixture of**
S-4424-50-5PE **C7+C8+C9+C10+C20+C40+BTEX (*n*-Alkanes+BTEX – Mix 2)**
Determination of Hydrocarbon Oil in Water Index
10 Analytes; each 50 µg/mL in *n*-Pentane; Units: 1x1 mL, 5x1 mL, 10x1 mL, 1x5 mL

S-4395-50-PE **ISO 9377-2 MOD Standard Mixture of**
S-4395-50-5PE **C7+C8+C9+C10-C40 (all even)+BTEX (*n*-Alkanes+BTEX – Mix 3)**
Determination of Hydrocarbon Oil in Water Index
25 Analytes; each 50 µg/mL in *n*-Pentane; Units: 1x1 mL, 5x1 mL, 10x1 mL (Certan bottle)

Other *n*-Alkane solutions available from Chiron:

S-4106-100-CY *n*-Alkanes, C10-C40 (all even+pristane/phytane), 18 Analytes, **(*n*-Alkanes - Mix 5)**
Units: 1x1 mL, 5x1 mL, 10x1 mL

S-4109-50-CY *n*-Alkanes, C10-C40 (all even and uneven), 31 Analytes, **(*n*-Alkanes - Mix 8)**
Units: 1x1 mL, 5x1 mL, 10x1 mL

S-4110-100-CY *n*-Alkanes, C10-C40 (all even and uneven+pristane/phytane), 33 Analytes, **(*n*-Alkanes - Mix 9)**
Units: 1x1 mL, 5x1 mL, 10x1 mL

S-4066-K-IO *n*-Alkanes, C14-C32 (all even+pristane/phytane), 12 Analytes, **(*n*-Alkanes - Mix 2)**
Units: 1x1 mL, 5x1 mL, 10x1 mL

S-4075-100-DC *n*-Alkanes, C10-C40 (all even+uneven C15-27+pristane/phytane), 24 Analytes, **(*n*-Alkanes - Mix 3)**
Units: 1x1.5 mL (Certan bottle), 1x5 mL, 1x10 mL (Screwcap)