wilks
simple analytical solutions

InfraCal 2 Analyzer

Model ATR-SP

User's Guide

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1. InfraCal 2, Model ATR-SP Overview

1.1. Introduction

The InfraCal 2 Analyzer is designed to measure solvent extractable material (hydrocarbons or oil and grease) by infrared determination in water, wastewater, or soil using hexane, pentane, cyclohexane or Vertrel MCA for the extraction procedure. A detector is with a fixed 3.4 μm (2940cm^{-1}) filter is used to measure hydrocarbon concentrations. The InfraCal 2 correlates with EPA Methods 1664 as well as with ASTM D7066 Method and EPA 413.1 and 418.1.

1.2. Basic measurement concept

The InfraCal 2 Analyzer makes use of the fact that hydrocarbons such as oil and grease can be extracted from water or soil through the use of an appropriate solvent and extraction procedure. The extracted hydrocarbons absorb infrared energy at a specific wavelength and the amount of energy absorbed is proportional to the concentration of oil and grease in the solvent. The analyzer can be calibrated to read out directly in the desired units such as %, ppm, mg/L or mg/kg.

The InfraCal 2 touch screen display includes the capability for multiple calibrations, a wizard guide for calibration, multi-level user database, multiple languages with user preference selection, high/low alarm and control limits, and measurements stored in a history table for recall or export to a flash or serial port.

1.3. Analyzer description

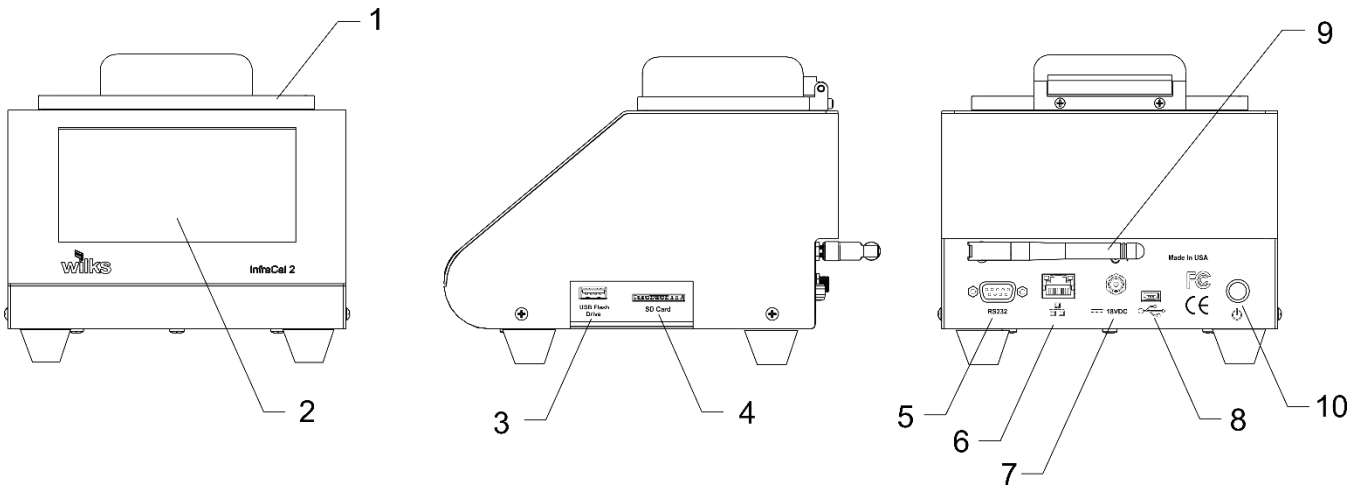

Figure 1: InfraCal 2 Layout

1. Transmission sample stage with cover
2. LCD touch screen
3. USB flash drive port
4. SD Card
5. RS232 port
6. Ethernet port
7. 18 VDC input
8. USB mini-B
9. WiFi antenna (optional)
10. On/Off push button

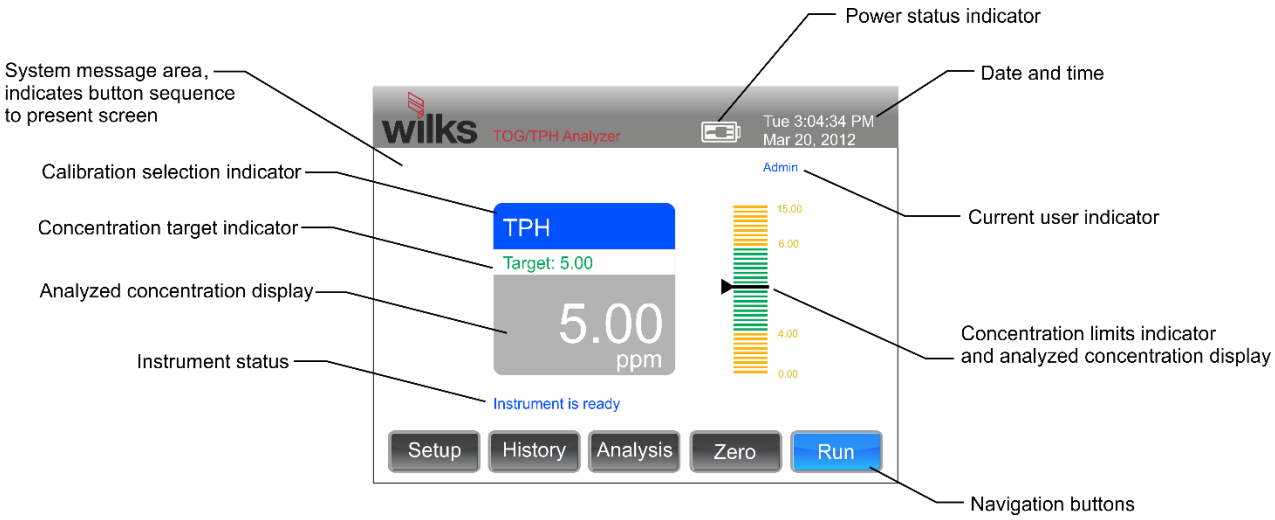

Figure 2: Touch Screen Layout

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2. Getting Started

2.1. Installation

2.1.1. Location

The InfraCal 2 Analyzer is designed for on-site measurements and is relatively insensitive to vibration and ambient temperature changes. For more sensitive readings below 1 ppm, it is best to avoid dramatic temperature changes such as direct sun or a location in the direct air flow of a heating or air conditioning vent.

2.1.2. Power requirements

A standard 18 volt power supply is provided with the analyzer and an optional internal battery pack is available at the time of purchase. The analyzer may be operated from any grounded A.C. outlet (line power requirements: 100 - 250 VAC, 50-60 Hz, 0.5-0.3 amps). When operating, the InfraCal 2 Analyzer uses 0.5 amps and up to 2.1 amps with the internal battery charging.

2.1.3. Warm up time

For normal operation, it is recommended that the instrument be allowed to warm up for 1 hour prior to use. The InfraCal 2 Analyzer draws very little power and, if used daily, it can be left on at all times (unless operated from the internal battery pack).

2.2. Initial setup – Quick start

2.2.1. Factory calibrated analyzer

See Section 4.1.3 in the InfraCal 2 Operation Manual for details on the analysis screens.

1. Select “Analysis” and highlight the desired calibration from the talbe.
2. Select “Edit” and “Next” to scroll through the optional alarm limits, zero expiration, calibration expiration or other parameters in the menu. Select “Done” when complete. Some options are not available to change in a factory calibration

3. Select “Done” again to begin analysis.
4. Select “Zero” then select “Set Zero”
5. Clean ATR crystal by putting solvent in the trough and wipe in one direction and allow to dry
6. Select “Zero”. If reading is not zero, repeat cleaning the ATR crystal and select “Zero” again.
7. If reading is still not zero and ATR crystal is clean, select “Set Zero” and “Done”. See section 2.4 for zeroing details.
8. For measurements below 2 ppm solvent purity testing is necessary. It is recommended to check solvent purity periodically for higher levels as well. See Section 2.4.1 below for Solvent Purity Testing.
9. The InfraCal 2 is now ready for sample analysis. See Section 4 “Analyzing a Sample” in this manual for details on sample preparation.

Note: If your analyzer has a cover for high level measurements with perchloroethylene, **do NOT close the cover with hexane measurements** as the hexane will not evaporate and your reading will include residual hexane.

2.2.2. Uncalibrated analyzer

See Section 4.1.3 in the InfraCal 2 Operation Manual for details on the analysis screens.

2.2.2.1. Setup

The user will need to set up as “Admin”

1. Select Setup
2. Under “User Name” choose Admin.
3. Select PIN to enter optional security pin. Enter a minimum of 4 digits to maximum of 15 followed by “=”
4. Select “Done”.
5. Select “Zero” then select “Set Zero”
6. Clean ATR crystal by putting solvent in the trough and wipe in one direction and allow to dry
7. Select “Zero”. If reading is not zero, repeat cleaning the ATR crystal and select “Zero” again.
8. If reading is still not zero and ATR crystal is clean, select “Set Zero” and “Done”. See section 2.4 for zeroing details.

2.2.2.2. Calibration

1. Select “Analysis”, then “New”.
2. Name the analysis by selecting the text box. Enter precision. For levels high level calibrations it should XXXXX. and for levels below 10 ppm it should be XXXX.X. Select desired units.
3. Select “Next” and set Run Countdown Timer (4 minutes is suggested) and Zero Countdown Timer (4 minutes is suggested for low level readings). Select “Skip” to activate the option to skip the timer during operation.
4. Set Measurement Time to 30 seconds. The zero and calibration expirations are optional.
5. Select “Next” and set “Maximum Range” to highest calibration point.
6. Select “Next” to set the optional alarm limits,
7. Select “Next” and a table will be displayed, select cell “Point 1” under “Absorbance” and enter “0”.
8. Select “Curve”.
9. With the appropriate standards covering the range of analysis, begin generating the calibration.
10. Begin with the lowest standard value. Select “Value” and enter the calibration standard value using the keypad followed by “=”
11. Put the **60** microliters of the standard into sample holder and select “Run”. Repeat the standard at least three times. The results will be shown on the left side of the screen. Select the results that

will be averaged for that standard value. If one of the results is significantly different, it should not be included in the calibration. Tap the value to deselect.

12. When complete, select "Add" and the first calibration point will be added to the table.
13. Select "Value" for the next calibration standard and repeat steps 10-12 for the remaining standards.
14. After the last standard, select "Back" to review the table. Adjustments can be made to the table by tapping the appropriate text box and using the keypad.
15. If the calibration is complete, select "Done". The calibration is now part of the Analysis table.
16. Select "Done" again to begin analysis. See Section 4 "Analyzing a Sample" for details on sample preparation in the InfraCal ATR-SP Manual for Oil in Water.
17. Once the calibration is entered, it is recommended that the solvent purity is checked. See Section 2.4.1 below for Solvent Purity Testing.

Note: If your analyzer has a cover for high level measurements with perchloroethylene, **do NOT close the cover with hexane measurements** as the hexane will not evaporate and your reading will include residual hexane.

2.3. Menu screens

After the start up screen, the main set up screen will appear with button for Setup, History, Analysis, Zero, and Run. See separate InfraCal 2 Operations Manual for details on screens and related functions.

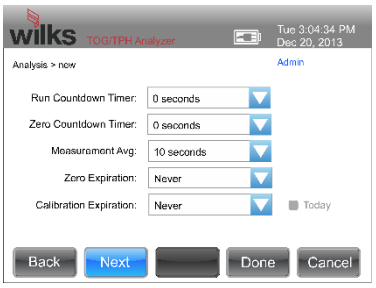

Figure 3: Setting zero timer screen

2.4. Zeroing the analyzer

The frequency for zeroing depends on the required sensitivity. For levels above 2 ppm, every hour should be sufficient. For levels below 2 ppm, the analyzer should be zeroed prior to each measurement on zero solvent and have the timer for zeroing and analysis each set to 4 minutes. For details on setting the timer see section 4.1.3 "Analysis screen" in the separate InfraCal 2 Operations Manual

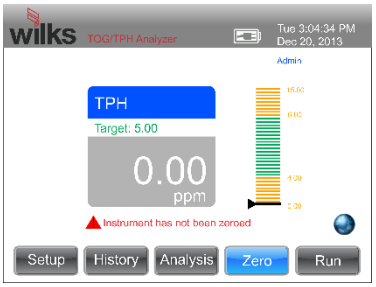

Figure 4: Zeroing

1. Select "Zero" then select "Set Zero"
2. Clean ATR crystal by putting solvent in the trough and wipe in one direction and allow to dry
3. Select "Zero". If reading is not zero, repeat cleaning the ATR crystal and select "Zero" again.
   If reading is still not zero and ATR crystal is clean, select "Set Zero" and "Done"

2.4.1. Solvent Purity Testing

For measurements below 10 ppm, solvent purity testing is necessary. It is recommended to check solvent purity periodically for higher level measurements as well.

a. Set zero timer to 4 minutes (See Section 4.1.3 in the InfraCal 2 Operation Manual for instructions on setting timer).
b. Eject **60** microliters of clean solvent using a syringe onto the center of the ATR crystal and select "Zero".
c. If there is contamination of the solvent and the reading is not zero, select "Set Zero" and "Done". Please note that this is not optimal and a better grade hexane should be obtained. Anything above 0.3 ppm will impact the results for measurements below 2 ppm and anything above 1 ppm will impact results for above 2 ppm levels. Again a better grade hexane should be obtained.
d. For sub ppm readings, zeroing on the solvent should be done prior to each reading.

3. Calibration

See Section 4.1.3 “Analysis screen” for detailed instructions to create or edit a calibration or Section 2.2.2 above for quick start instructions.

3.1. Considerations for calibration standards

The following are options for calibration:

1. Non-certified factory calibration. Wilks Enterprise can provide the InfraCal 2 Analyzer with a non-certified factory calibration for different ranges of analysis and with different solvents.
2. Purchase pre-prepared standards from Wilks Enterprise.
3. Prepare your own standards. Standard preparation is described in detail in section 3.3.
4. Certified calibration by an independent laboratory.

3.2. Preparing calibration standards

Standards can be prepared using a non-volatile (heavy weight) oil without additives such as high grade mineral oil. Calibration standards should cover the desired range for the analysis. An ideal calibration set contains a minimum of five samples. For example, if your range is 5 – 250 mg/L the standards could be 25, 50, 100, 150, 200 and 250 mg/L.

The calibration curve for oil and grease is typically linear up to 300 ppm for oil in water with a 10:1 (3000 mg/kg for a1:1 oil in soil extraction ratio) above which the curve flattens out. The linear range will be accurate up to the highest calibration standard. Samples above the highest calibration point can be diluted to within the calibration range or an additional calibration can be created for higher range samples. See section 4.5 for dilution procedure or create/select a second calibration for the higher range.

3.2.1. Gravimetric standards

Supplies needed for gravimetric calibration

125 ml Teflon wash bottle
10 ml and/or 20 ml volumetric flasks
Calibrated glass pipettes in the 0.5-3 ml range (depending of desired stock solution dilutions)
40 ml vials with Teflon lined caps (at least 3 for holding standards)
Solvent (see Appendix B for solvent options)
Calibration oil
Analytical Balance that reads to 0.001 gram

Prepare a stock solution and make the appropriate dilutions to cover analysis range. For water analysis with an extraction ratio of 10:1, the oil and grease is concentrated 10 times in the solvent. The actual value of the standard is divided by 10 in order to match the concentrated value of the extract.

1. Weigh about 0.1 gram of oil in a 10 ml volumetric flask.
2. Record the exact weight.
3. Fill with solvent up to the 10 ml line.

If the exact weight were 0.11, the exact concentration is calculated below:
0.110 g/10 ml = 110 mg/10 ml = 11,000 mg/L

To make the standard match the value for the concentration in the sample for a 10:1 oil in water extraction, the actual value of the oil in solvent is divided by 10.
11,000/10 = 1,100 mg/L

Note: *For a 1:1extraction ratio with TPH in soil, the actual stock solution value is not divided by 10.*
For each standard, using a calibrated glass pipette, pipette the stock solution into a 10 or 20 ml volumetric flask and fill with solvent.

Using the example of a 1,100 mg/L stock solution, dilutions could be as follows:

Stock solution	Solvent	Standard value*
2 ml	Fill to 10 ml	220
3 ml	Fill to 20 ml	165
1 ml	Fill to 10 ml	110
0.5 ml	Fill to 10 ml	55
0.5 ml	Fill to 20 ml	27.5

*For a 1,100 mg/L stock solution

3.3. Calibrating the analyzer

See Section 4.1.3 "Analysis screen" in the InfraCal 2 Operations Manual for a review of the screens used to set up a calibration and Section 2.2.2.2 above for a step by step procedure to enter calibration data.

3.3.1. Collecting calibration data

1. Allow the analyzer to warm up at least one hour.
2. Zero prior to running calibration standards (see section 2.4).
3. Using a 100 μm syringe deposit the lowest value standard, deposit **60** microliters in the center of the ATR crystal. It is recommended to repeat each standard at least three times. The calibration wizard can automatically average the readings. Repeat for all of the standards. The option is available to create as many calibrations as desired.

Note: *The results can plotted graphically as a calibration curve. The resulting plot can be used to prepare a reference chart for users who prefer not to use the analyzer's internal calibration program for data points to be edited into calibration and prefer to enter data directly into the calibration table.*

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4. Analyzing a Sample

These extraction procedures are a simplified version of EPA methods 1664, 418.1 or 413.2 and ASTM Method D 3921 or D7066. The EPA or ASTM extraction methods may be used if desired.

Note: If your analyzer has a cover for high level measurements with perchloroethylene, **do NOT close the cover with hexane measurements** as the hexane will not evaporate and your reading will include residual hexane.

4.1. Analyzer pre-check

1. For calibration, allow the analyzer to warm-up and stabilize for one hour
2. Ensure that the ATR crystal is clean.
3. Perform a zero check (section 2.4)
4. Make sure glassware and sample containers are clean. A solvent rinse of glassware especially for low level measurements may be required.

4.2. 10 to 1 Extraction procedure for oil in water

4.2.1. Supplies needed for extraction in water

125-ml Teflon wash bottle

100-ml stoppered graduated cylinder or Sample bottle graduated in mL (ie: 125-ml graduated bottles)

125-ml stopper separatory funnel or sample bottles with septa caps (for solvents heavier than water, ie: Vertrel MCA)

Hydrochloric (HCl) or sulfuric acid (H_2SO_4)(dilute with water 1:1)

pH indicator strips or pH meter

10-ml or 25-ml Graduated cylinder (depending on sample size)

Sodium sulfate (Na_2SO_4), ACS, granular anhydrous (For TOG only, not necessary for TPH readings)

Glass funnel

Whatman 40 filter paper, 11cm, or equivalent

Silica gel (for TPH), anhydrous, 75-150 micrometers

Disposable polyethylene pipette or equivalent

100-microliter syringe

5-mL syringe (for use with prescription bottles and solvents heavier than water)

Solvent (see Appendix B for solvent options)

4.2.2. Considerations:

- Make sure glassware for use in analysis is clean. Any residual hydrocarbons in the glassware and sampling containers will be extracted and added to the TOG or TPH reading. To check the glassware, rinse with solvent then put **60** microliters on the ATR crystal to test for cleanliness.
- Oil and grease tends to adhere to the surfaces it comes in contact with. Use the entire sample collected. Either mix the solvent and sample in the sample collection container or rinse the sample collection container with a portion of the solvent to be used for extraction.
- The mechanical details of the extractions are a little different depending on whether the solvent is lighter than water (hexane) or is heavier than water (Vertrel MCA) but in all other respects the methods are identical.

NOTE: *Any hydrocarbons in the sample that have a lower boiling point than the extracting solvent will be lost in the evaporation process.*

4.2.3. Total Oil and Grease (TOG) Extraction from Water for Solvents Heavier than Water (ie: Vertrel MCA)

1. Pour measured sample into separatory funnel. Rinse the sample collection container and graduated cylinder with a portion of the solvent to be used for extraction. If using a graduated bottle with a septa cap, solvent can be mixed directly in the bottle without using the separatory funnel.

2. Adjust the pH to less than 2 with Hydrochloric acid or Sulfuric Acid (typically 3-5 drops depending on buffers in sample).
3. Add one tenth of the sample size of solvent to the sample collection container to rinse interior surfaces and cap. (With the 177-ml prescription bottle, it is convenient to collect 140 ml of sample and add 14 ml of solvent). Pour this solvent into separatory funnel containing sample or if a septa cap is used, the sample can be mixed and extracted from the bottle.
4. Shake the separatory funnel or bottle vigorously for 2 minutes with periodic venting to release excess pressure.
5. Allow the phases to separate.
6. Place a filter paper in a filter funnel and add approximately 1 gram (1Tablespoon) of sodium sulfate.
7. Drain the solvent (lower) layer from the separatory funnel through the sodium sulfate into a clean container (10-mL graduated cylinder can be used). With the prescription bottle, invert the bottle so that the solvent layer fills the neck. Using a 5 ml syringe withdraw 4-5 mL of the solvent layer and deliver through the sodium sulfate into a clean container.

Note: *Use of the sodium sulfate is necessary to prevent water from interfering with the analysis. With totally hydrophobic solvents, this step may be skipped. It is not necessary to collect all of the solvent but it is necessary to preclude water to prevent caking of the sodium sulfate. Sodium sulfate may also help if there is a persistent emulsion layer.*

8. Eject **60** microliters of solvent extract using a syringe onto the center of the ATR crystal and select "Run".

4.2.4. Total Oil and Grease (TOG) Extraction from Water for Solvents Lighter than Water (ie: hexane, pentane, cyclohexane)

1. Pour sample into a stopper graduated cylinder and measure. Rinse the sample collection container with a portion of the solvent to be used for extraction. If using a graduated bottle solvent can be mixed directly in the bottle. Adjust the pH to less than 2 with Hydrochloric acid or Sulfuric Acid (typically 3-5 drops depending on buffers in sample).
2. Add one tenth of the sample size of solvent to the sample collection container to rinse interior surfaces and cap. (With the 177-ml prescription bottle, it is convenient to collect 140 ml of sample and add 14 ml of solvent). Pour this solvent into graduated cylinder containing the sample.
3. Shake the graduated cylinder or graduated bottle vigorously for 2 minutes with periodic venting to release excess pressure.
4. Allow the phases to separate.
5. Place a filter paper in a filter funnel and add approximately 1 gram (1Tablespoon) of sodium sulfate.
6. Withdraw 4-5 mL of the solvent layer and deliver through the sodium sulfate into a clean container.

Note: *Use of the sodium sulfate is necessary to prevent water from interfering with the analysis. With totally hydrophobic solvents, this step may be skipped. It is not necessary to collect all of the solvent but it is necessary to preclude water to prevent caking of the sodium sulfate. Sodium sulfate may also help if there is a persistent emulsion layer.*

7. Eject **60** microliters of solvent extract using a syringe onto the center of the ATR crystal and select "Run".

8. If the result is above the calibration range, see section 4.5 for dilution procedure or create/select a second calibration for the higher range.

4.2.5. Total Petroleum Hydrocarbon (TPH) Extraction from Water

The difference between TPH (Total Petroleum Hydrocarbon) and TOG (Total Oil and Grease) is the polar organics are removed from the extract using silica gel. The remaining hydrocarbons are the non-polar components considered to be TPH.

1. Follow the above procedure steps 1-5 for solvents heavier than water and 1-4 for solvents lighter than water. (The Sodium Sulfate procedure is not necessary as the silica gel will remove any water in the solvent.)
2. Place a filter paper in a filter funnel and add approximately 1 teaspoon of silica gel.
3. Pour extract from container though the silica gel into a clean container.
4. Eject **60** microliters of solvent extract using a syringe onto the center of the ATR crystal and select "RUN".
5. If the result is above the calibration range, see section 4.5 for dilution procedure or create/select a second calibration for the higher range.

4.3. 1 to 1 Extraction Procedure for oil in soil

4.3.1. Supplies needed

40-mL vials with Teflon-faced caps
10-mL or 25-mL Graduated cylinder (depending on sample size)
Sodium sulfate (Na_2SO_4), ACS, granular anhydrous (For TOG Only, not necessary for TPH readings)
Glass funnel (for TPH)
Whatman 40 filter paper, 11cm, or equivalent (for TPH)
Silica gel (for TPH), anhydrous, 75-150 micrometers
50-microliter syringe
Disposable polyethylene disposable pipette or equivalent
Plastic air syringe with filter frit and plunger (or equivalent)
Sample spatula
Solvent (see Appendix C for solvent options)
Analytical balance that reads to .1 gram

4.4. 1 to 1 Extraction procedure for TPH in soil

4.4.1. Supplies needed for extraction in soil

40-mL vials with Teflon-faced caps (EPA/VOA)
10-mL or 25-mL Graduated cylinder (depending on sample size)
Glass funnel
Whatman 40 filter paper, 11cm, or equivalent
Silica gel anhydrous, 75-150 micrometers
Disposable polyethylene disposable pipette or equivalent
Plastic air syringe with filter frit and plunger (or equivalent)
Sample spatula

Solvent (see Appendix B for solvent options)
Analytical balance that reads to 0.1 gram

4.4.2. TPH soil extraction procedure

1. Collect a soil sample directly in a washed and weighed (to the nearest 0.1 gram) EPA/VOA 40 ml vial. The sample should be about ¾ of the volume of the vial.
2. Weigh the sample to the nearest 0.1gram, subtracting the tare weight of the vial. Note the weight.
3. If the sample is wet and clumpy, add up to 5 grams of silica gel. Use the spatula to break up the clumps.
4. Add the same amount of solvent in ml as the soil sample weight in grams (do not include the weight of the silica gel). ie: for 11.2 grams of soil, add 11.2 ml of solvent. This will give a 1:1 extraction ratio.
5. Cap the vial with the Teflon side of the liner toward the sample. Shake vigorously for 2 minutes.
6. Pour the solvent into the plastic air syringe with filter frit, leaving as much of the soil in the vial as possible.
7. Place the plunger into the air syringe force the solvent through the filter frit into a clean container or directly into the cuvette.
8. Place a filter paper in a filter funnel and add approximately 1 teaspoon of silica gel.
9. Eject **60** microliters of solvent extract using a syringe onto the center of the ATR crystal and select "RUN".
10. Select "Run" and the value will be displayed.
11. If the result is above the calibration range, see section 4.4 for dilution procedure or create/select a second calibration for the higher range.

4.5. Dilution Procedures

If the sample reading is above the highest calibration point, a dilution must be performed to bring it into the measurement range. A second high range calibration may also be used. See Section 4.1.4 in the InfraCal 2 Operations Manual for details on creating or selecting a new calibration.

4.5.1. 10:1 Dilution

1. Pour 1 ml of solvent extract into a 10-mL graduated cylinder
2. Add 9 mL of solvent for a 10 to 1 dilution.
3. Mix and eject 60 microliters of solvent extract using the syringe onto the center of the ATR crystal and select "RUN".
4. Add a zero to the result on the InfraCal 2's display and record your reading, i.e. if the result is 465, the extract value after dilution is 4650 ppm.
5. This procedure may be repeated if the extract is still not within the calibration range. Add two zero's to the InfraCal 2's display if two dilutions are performed.

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5. Service and Customer Support

Your InfraCal 2 Analyzer may have been purchased either directly from Wilks Enterprise or from a local dealer or representative. If you have a technical question relative to the operation of the instrument or relative to the analysis, please contact Wilks Enterprise at the contact address provided below:

Customer Services Department
Wilks Enterprise, Inc.
25 Van Zant Street, Suite 8F
East Norwalk, CT 06855
USA

Telephone: **(203) 855-9136**
FAX: **(203) 838-9868**
E-mail:tech@WilksIR.com

Service and Repair

During the warranty period, Wilks Enterprise, Inc. offers free factory service for all failures that occur from normal instrument usage. The user is only required to cover the cost of shipping the instrument to the factory. After the warranty period, the user is required to cover the factory's cost of servicing plus all shipping charges. For extended service contracts or factory service charges, please contact Wilks Enterprise, Inc. for details.

Appendix A: Correlation to an Alternate Method

The following can be used to calculate revised calibration points to re-enter into calibration table as a scale factor. For details on how to access the calibration table, see Section 4.1.4 in the InfraCal 2 Operations Manual.

Example 1: Assume the sample results on the **InfraCal 2** are consistently lower than the alternate method as follows:

SAMPLE A = 25 ppm
SAMPLE B = 13 ppm
SAMPLE C = 11 ppm

Assume the **alternate method** results used to analyze the duplicate samples are consistently higher than the InfraCal 2 as follows:

SAMPLE A= 63 ppm
SAMPLE B= 33 ppm
SAMPLE **C**= 28 ppm

Add the results of all samples for the InfraCal and the alternate method.

InfraCal results: 25 + 13 + 11 = 49 ppm
Alternate Method Results: 63 + 33 + 28 = 124 ppm

Divide the total alternate method results by the InfraCal results
124/49 = 2.531

Enter the result (2.531 for this example) into the Scale Factor column of the Calibration Table

Example 2: Assume the sample results on the **InfraCal 2** are consistently higher than the alternate method as follows:

SAMPLE A = 63 ppm
SAMPLE B = 33 ppm
SAMPLE C = 28 ppm

Assume the **alternate method** results used to analyze the duplicate samples are consistently lower than the InfraCal 2 as follows:

SAMPLE A= 25 ppm
SAMPLE B= 13 ppm
SAMPLE C= 11 ppm

InfraCal results: 63 + 33 + 28 = 124 ppm
Alternate Method Results: 25 + 13 + 11 = 49 ppm

Divide the total alternate method results by the InfraCal results
49/124 = 0.395

Enter the result (0.395 for this example) into the Scale Factor column of the Calibration Table

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Appendix B: Solvent Options

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..

Pentane A volatile hydrocarbon preferred in some regions 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. As Vertrel MCA is heavier than water, the solvent after extraction will rest on the bottom and require a separatory funnel or an inverted vial with a septa cap for solvent removal.