Organic Constituents, UV-Absorbing (UV-254)

DOC316.53.01092

Direct Reading Method[1]

Method 10054

Scope and application: For the determination of UV-absorbing organic compounds in drinking water and surface water.

[1] Adapted from *Standard Methods for the Examination of Water and Wastewater*, Method 5910.

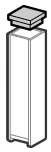
Test preparation

Instrument-specific information

Table 1 shows all of the instruments that have the program for this test. The table also shows requirements that can change between instruments, such as adapter and sample cell requirements.

To use the table, select an instrument, then read across to find the applicable information for this test.

Table 1 Instrument-specific information

Instrument	Adapter	Sample cell orientation	Sample cell
DR 6000	LZV902.99.00020 (universal) LZV902.99.00002 (1-cm carousel)	The clear side is to the right.	2624410 
DR 5000	A23618	The clear side is toward the user.	

Before starting

The sample pH must be 4 to 10 for accurate results. For SUVA calculations, do not adjust the sample pH.
Use a non-plastic filter assembly. Use a glass fiber filter of nominal pore size (1 to 1.5 µm) with no organic binder. For SUVA calculations, use a 0.45-µm filter and vacuum filtration apparatus.
Use only quartz sample cells for this test.
Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.
Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

Items to collect

Description	Quantity
Organic-free reagent water	varies
Filter assembly	1
Buret stand	1
Sample cells (For information about sample cells, adapters or light shields, refer to Instrument-specific information on page 1.)	1

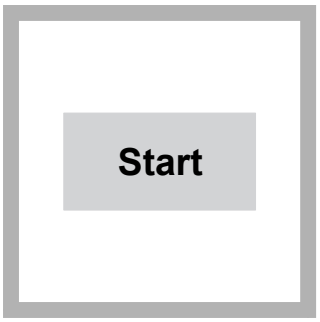
Refer to Consumables and replacement items on page 4 for order information.

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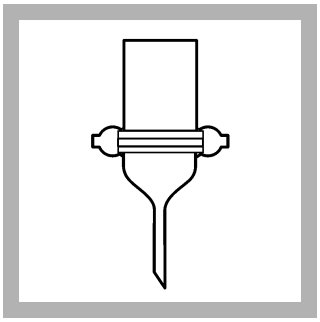
Sample collection

- Collect samples in clean glass bottles.
- Analyze the samples as soon as possible for best results.

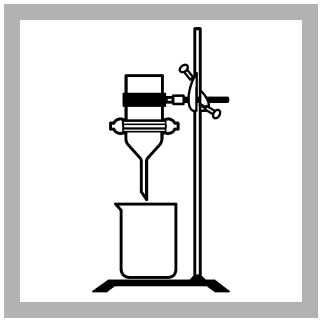
Test procedure



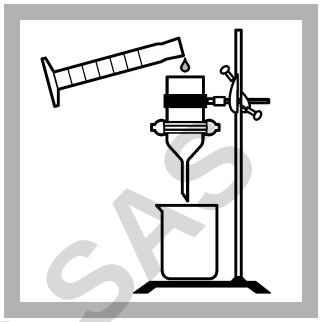
1. Start program **410 Organics, UV - 254**. For information about sample cells, adapters or light shields, refer to Instrument-specific information on page 1.



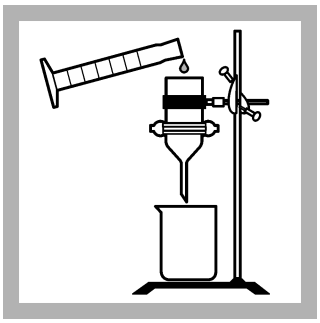
2. Assemble the filter apparatus. Make sure to use the white PTFE support plate. Insert the filter with the wrinkled surface pointed up.



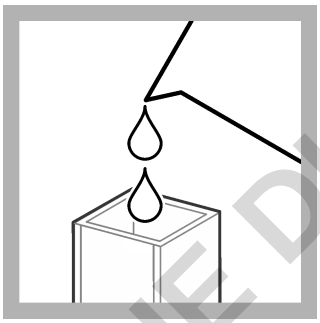
3. Install the apparatus in a support stand. Put a clean glass beaker below the filter.



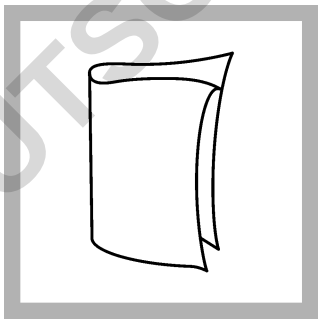
4. Prewash the filter assembly: Pour 50 mL of organic-free reagent water through the filter to remove soluble matter from the filter. Discard the filtered water.



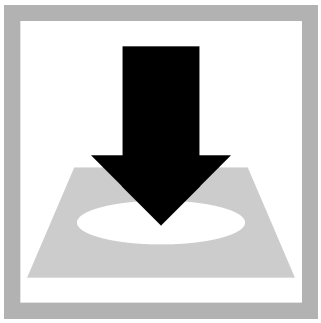
5. Prepare the sample: Pour 50 mL of sample through the filter.



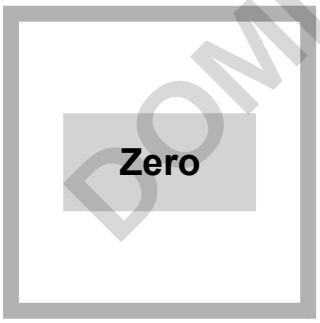
6. Prepare the blank: Rinse the sample cell several times with organic-free reagent water. Fill the sample cell with organic-free reagent water.



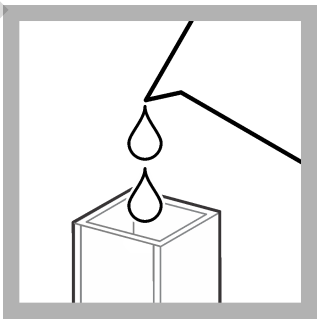
7. Clean the blank sample cell.



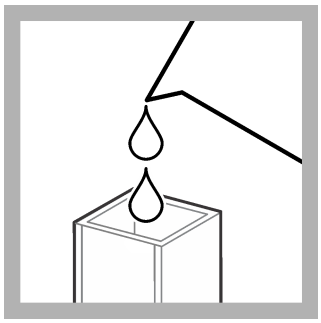
8. Insert the blank into the cell holder.



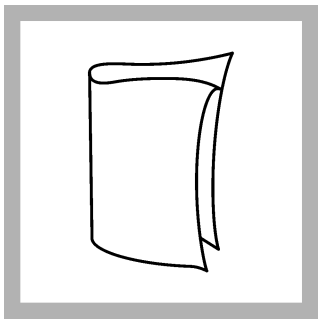
9. Push **ZERO**. The display shows 0.000 cm^{-1} and 1-cm cell. If necessary, wait 2 to 3 minutes for the Lamp Warm Up to complete.



10. Discard the contents of the blank sample cell. Rinse the sample cell several times with the filtered sample.

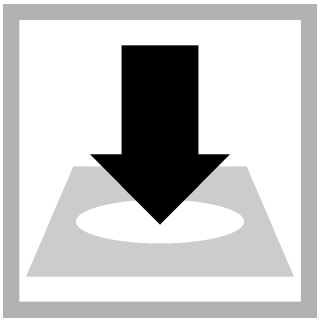


11. Fill the sample cell with the filtered sample.

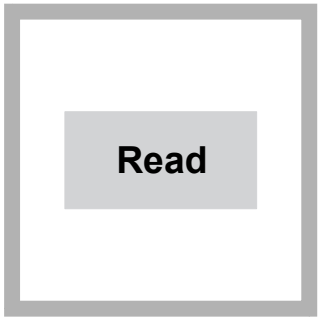


12. Clean the sample cell.

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13. Insert the sample cell into the cell holder.



14. Push **READ**. Results show in absorbance per centimeter (cm^{-1}).

Interferences

Interfering substance	Interference level
Extreme sample pH	Add 1 N Sodium Hydroxide or 1 N Sulfuric Acid to the sample to adjust the sample pH to 4 to 10.
UV-absorbing inorganics (bromide, ferrous iron, nitrate, nitrites)	Refer to Identify interferences in the sample on page 3.
UV-absorbing oxidants and reductants (chloramines, chlorates, chlorites, ozone, thiosulfates)	

Identify interferences in the sample

Do a baseline scan from 200 to 400 nm on the sample and the blank to identify if there are interferences in the sample.

1. From the main menu, push **WAVELENGTH SCAN>OPTIONS>λ**.
2. Push **200>OK**.
3. Push **400>OK**.
4. Push **1 NM>OK**.
5. Do steps 5 to 14 of the test procedure.
   If the sample scan shows sharp peaks, interferences may be in the sample.

Typically, natural organic material shows a featureless curve in the UV region with increased absorption as the wavelength decreases. If sharp peaks show, select and report a different wavelength.

Clean the sample cells

⚠WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

Clean new and dirty sample cells before use to remove all organic contamination. When the sample cells are rinsed every time with organic-free reagent water after use, it is only necessary to clean the sample cells occasionally.

1. Put the sample cells in 19.2 N Sulfuric Acid for a maximum of 12 hours.
2. Rinse the sample cells 10 times or more with organic-free reagent water.

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Method performance

The method performance data that follows was derived from laboratory tests that were measured on a spectrophotometer during ideal test conditions. Users can get different results under different test conditions.

Program	Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
410	—	0.431 to 0.433 cm^{-1}	—

Summary of method

The filtered sample is measured at 254 nm to show organic constituents in the sample water. Organic-free reagent water is used for the blank sample cell. Results are given in absorbance per centimeter (cm^{-1}). The results are used to calculate Specific Ultraviolet Absorbance (SUVA).

Consumables and replacement items

Required reagents

Description	Quantity/Test	Unit	Item no.
Organic-Free Reagent Water	varies	500 mL	2641549

Required apparatus

Description	Quantity/test	Unit	Item no.
Beaker, 100 mL	1	each	50042H
Buret stand	1	each	32900
Clamp holder	1	each	32600
Clamp, 3-prong	1	each	42200
Filter funnel assembly, 7-cm	1	each	2164100
Filter plate, PTFE, for filter funnel assembly	1	each	2164200
Filter, glass fiber, 70-mm	1	100/pkg	253053
Sample cell, 1-cm quartz	1	each	2624410

Optional reagents and apparatus

Description	Unit	Item no.
Cell holder for 10-cm sample cells (DR 5000 only)	each	LZY421
Sulfuric Acid Standard Solution, 19.2 N	500 mL	203849
Sodium Hydroxide Standard Solution, 1.00 N	100 mL MDB	104532
Sulfuric Acid Standard Solution, 1 N	100 mL MDB	127032
Filter pump, aspirator (SUVA)	each	213100
Filter, membrane, hydrophilic, polyethersulfone SUVA, 0.45 micron, 47 mm	100/pkg	2894700
Filter holder, glass for vacuum filtration (SUVA)	each	234000
Flask, filtering, glass, 1000 mL (SUVA)	each	54653
Graduated cylinder, 50 mL	each	50841
Paper, pH, 1.0–11.0	5 rolls/pkg	39133
Potassium Acid Phthalate (KHP), ACS	500 g	31534
Sample cells, 1-cm quartz matched pair	each	4822800

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Optional reagents and apparatus (continued)

Description	Unit	Item no.
Sample cell, 5-cm rectangular quartz	each	2624450
Sample cell, 10-cm rectangular quartz	each	2624401
Standard Methods for the Examination of Water and Wastewater (current edition)	each	2270800
Tubing, latex rubber (SUVA), 5/16-in. inside diameter	3.66 m (12 ft)	56019

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