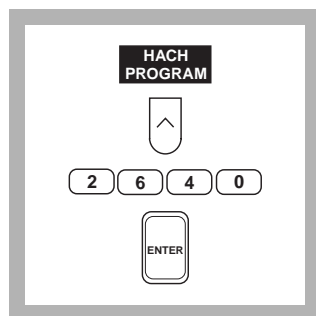




Scope and Application: To indicate the total concentration of UV-absorbing organic compounds in drinking water. No estimated detection limit exists because it is a non-specific measurement. A DR4000U model is required.

* Adapted from *Standard Methods*, 19th. Ed., Method 5910



1. Press the soft key under **HACH PROGRAM**.

Select the stored program number for the Organics, UV-254 method, by pressing **2640** with the numeric keys.

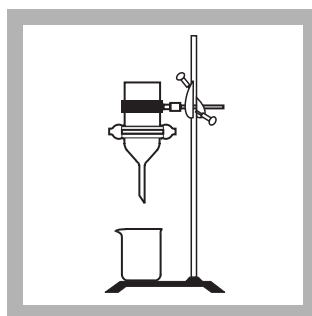
Press: **ENTER**



2. The display will show: **HACH PROGRAM: 2640 Organics, UV-254**

The wavelength (λ), **253.7 nm**, is automatically selected.

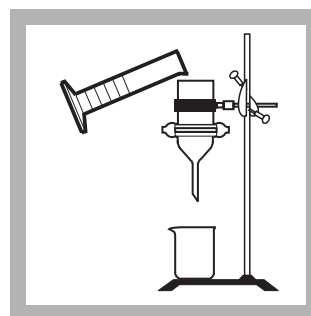
Note: If the UV lamp has been "OFF," allow a few minutes for full warm-up and stabilization.



3. Assemble the filter apparatus which includes the glass filter funnel, PTFE support plate, and install one 70-mm glass fiber filter. Be sure to use the white PTFE support plate. Place the filter with the wrinkled surface upward. Mount the apparatus into a support stand and place a clean glass beaker underneath it.

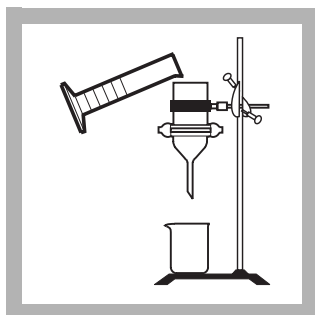
Note: Any non-plastic filter assembly can be used. Use a 0.45- μm or glass fiber filter of nominal pore size (1–1.5 μm) without organic binder.

Note: A 0.45- μm filter must be utilized if the results are to be used for SUVA calculations.



4. Prewash the filter assembly by pouring at least 50 mL of Organic-Free Reagent Water through the filter. Discard the filtered water.

Note: Pre-rinsing removes any soluble impurities from the filter.

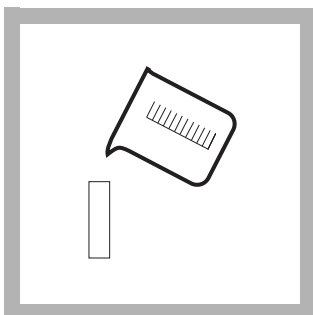


5. Pour 50 mL of sample through the filter and collect the filtered sample.

Note: The sample pH should be between 4 and 10. If not, see the Interferences section.

Note: Samples used for SUVA calculations must **not** be pH adjusted

Note: See Sample Collection, Storage and Preservation following these steps.

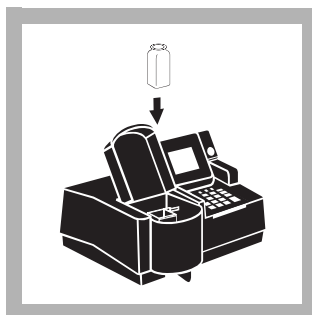


6. Rinse a clean 1-cm quartz cell several times with Organic-Free Reagent Water. Fill the cell with Organic-Free Reagent Water (the blank). Wipe the cell walls thoroughly.

Note: Use only Organic-Free Reagent Water to zero the instrument.

Note: A 1-inch or 1-cm Flow Cell Module or Sipper Module is highly recommended for best results. Be sure to satisfy the minimum volume requirements for each module type.

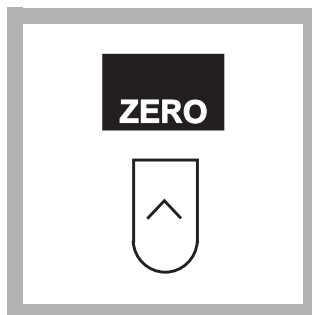
Note: Organic-Free Reagent Water, filtered at 0.45 μm , must be used as the blank for SUVA calculations.



7. Insert a 1-cm cell adapter into the cell compartment. Place the blank into the 1-cm adapter with the clear windows aligned with the light beam. Close the light shield.

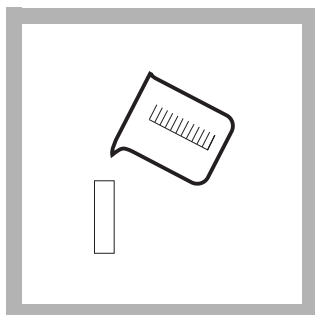
Note: Handle the cell only on the frosted sides.

Note: Occasionally clean cells using chromic acid to remove trace organic contamination. See Cell Cleaning following these steps.

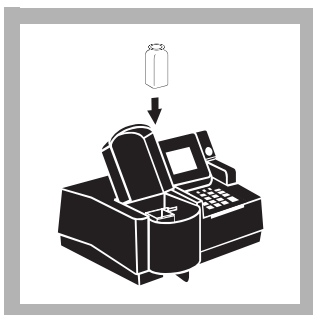


8. Press the soft key under **ZERO**.

The display will show **0.000 cm⁻¹**



9. Discard the blank water from the cell and rinse the cell several times with filtered sample. After rinsing, fill the cell with filtered sample. Wipe the cell walls to remove fingerprints.



10. Place the cell containing the sample into the cell holder. Close the light shield. Results in absorbance per centimeter (cm^{-1}) will be displayed.

Note: For optimum results, the cm^{-1} value should fall between 0.005 and 0.900. If less than 0.005 absorbance using a 1-cm cell, use either a 1" Flow-Thru cell, 5-cm or 10-cm quartz cells. Press the soft keys under **OPTIONS** and then **FORM:**. Press the soft key under **FORM:** to scroll to the cell pathlength you wish to use. The display will indicate which cell pathlength you have selected. The displayed results (in absorbance per centimeter) will be corrected for the cell pathlength selected. If cm^{-1} results are greater than 0.900, accurately dilute the sample with Organic-Free Reagent Water. Correct the test result by the appropriate dilution factor.

Interferences

Table 1 Interfering Substances and Suggested Treatments

Interfering Substance	Interference Levels
Sample pH outside 4–10	Add either 1 N Sodium Hydroxide or 1 N Sulfuric Acid to the sample to adjust sample pH 4-10.
UV-absorbing inorganics (bromide, ferrous iron, nitrate, nitrites)	Follow the UV scanning procedure below.
UV-absorbing Oxidants and reductants (chloramines, chlorates, chlorites, ozone, thiosulfates)	Follow the UV scanning procedure below.

To determine the presence of interferences, a scan of the filtered sample versus Organic-Free Reagent Water is recommended on a regular basis:

1. From the main menu, press the soft key under **SCAN** λ .
2. Press the soft key under **OPTIONS**.
3. Press the soft key under λ **MIN:** and enter **2 0 0**. Press **ENTER**.
4. Press the soft key under λ **MAX:** and enter **4 0 0**. Press **ENTER**.
5. Press the soft key under λ **STEP;** then press the soft key under **1.0 NM**. Press **ENTER**.
6. Press **EXIT**.
7. Place the cell containing the Organic-Free Reagent Water (the blank) into the cell compartment and close the light shield.
8. Press the soft key under **BASELINE**. The baseline scan from 400 to 200 nm will begin.
9. After the baseline scan is recorded, place the cell containing the filtered sample into the adapter and close the light shield.
10. Press the soft key under **START SCAN**.

If the sample scan shows relatively sharp peaks, interferences may be present. Generally, natural organic matter will show a relatively featureless curve in the UV region with increasing absorption as the wavelength decreases. If the sharp peaks are indicated, an alternate wavelength should be selected and reported.

Sample Collection, Storage and Preservation

Collect samples in cleaned glass containers. Do not use plastic containers. Analyze samples as soon as possible after collection.

Cell Cleaning

New or dirty cells should be soaked with Chromic Acid Cleaning Solution (Cat. No. 1233-49) to remove trace organic contamination. Allow to soak overnight or up to 12 hours. After soaking, rinse with at least 10 volumes of Organic-Free Reagent Water. Treatment of cells with chromic acid is required only occasionally if cells are rinsed with Organic-Free Reagent Water after use.

Method Performance

Precision

Standard: There is no primary standard or calibration for the UV-254 method. Using a Potassium Acid Phthalate solution equivalent to 30-mg/L as carbon, the following reproducibility data was obtained using one instrument:

Program	95% Confidence Limits
2640	0.431–0.433 cm ⁻¹

Estimated Detection Limit

Because it is a non-specific measurement for organic constituents, there is no estimated detection limit for Program 2640.

Sensitivity

There is no calibration for Program 2640, so sensitivity data is not available.

Summary of Method

Filtered sample is measured at 253.7 nm against organic-free water as a indicator of organic constituents in the sample water. Results are automatically reported in absorbance per centimeter (cm⁻¹). The results can be used in calculating Specific Ultraviolet Absorbance (SUVA).

Safety

The Chromic Acid Cleaning Solution (Cat. No. 1233-49) is very toxic. Avoid inhalation and wear protective equipment as prescribed in the *Material Safety Data Sheet*. Good safety habits and laboratory techniques should be used throughout the procedure. Consult the *Material Safety Data Sheet* for information specific to the standards and reagents used. For additional information, refer to Section 1.

Pollution Prevention and Waste Management

The Chromic Acid Cleaning Solution (Cat. No. 1233-49) is regulated as a hazardous waste for chromium (D007) and corrosivity (D002) when disposed per Federal RCRA. The 1.0 M Hydrochloric Acid Solution (Cat. No. 23213-53) and the 1.00 N Sodium Hydroxide Standard Solution (Cat. No. 1045-32) are regulated as hazardous waste for corrosivity when disposed per Federal RCRA. Elementary neutralization of these two solutions will be an option for most users. For further information on pollution prevention and waste management, refer to Section 1.

ORGANIC CONSTITUENTS, UV Absorbing (UV-254), continued

REQUIRED REAGENTS AND STANDARDS

Description	Quantity Required Per Test	Unit	Cat. No.
Organic-Free Reagent Water	varies	1 L	26415-53

REQUIRED EQUIPMENT AND SUPPLIES

DR/4000 1-cm Quartz Cells	1	each	26244-10
DR/4000 1-cm Cell Adapter	1	each	48584-00
Filter Funnel Assembly, 7-cm	1	each	21641-00
Filter Plate, PTFE, for 21641-00	1	each	21642-00
Filter, glass fiber, 70-mm	1	100/pkg	2530-53
Beaker, 100-mL	1	each	500-42
Clamp Holder	1	each	326-00
Clamp, 3-Prong	1	each	422-00
Buret Stand	1	each	329-00

OPTIONAL REAGENTS AND STANDARDS

Hydrochloric Acid Solution, 1.0 M	1 L	23213-53
Sodium Hydroxide Standard Solution, 1.00 N	100 mL* MDB	1045-32
Chromic Acid Cleaning Solution	500mL	1233-49

OPTIONAL EQUIPMENT AND SUPPLIES

Cylinder, graduated, 50-mL	each	508-41
DR/4000 Carousel Module	each	48070-02
DR/4000 1-inch Flow Cell Module	each	48070-04
DR/4000 1-inch Sipper Module	each	48090-03
DR/4000 1-cm Flow Cell Module	each	48070-05
DR/4000 1-cm Sipper Module	each	48090-06
DR/4000 5-cm Cell Adapter	each	48186-00
DR/4000 10-cm Cell Adapter	each	48118-00
Filter, membrane, 47-mm; 0.45-microns (SUVA)	each	13530-00
Filter Holder, glass for vacuum filtration (SUVA)	each	2340-00
Flask, filtering, glass, 1000-mL (SUVA)	each	546-53
pH Paper, pH 1.0 to 11.0	5 rolls/pkg	391-33
pH Meter, <i>sensio</i> TM 1, portable	each	51700-02
Quartz Sample Cell, 5-cm	each	26244-50
Quartz Sample Cell, 10-cm	each	26244-01
Tubing, rubber	12ft	560-19

* Contact Hach for larger sizes.



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