

Organic Constituents, UV Transmission (UV-254)

DOC316.53.01305

Direct Reading Method¹

Method 10243

Scope and application: For use in the determination of the UV lamp output settings for disinfection systems with continuous-flow UV reactors, for the compliance monitoring of UVT analyzer calibrations and for the determination of UVT water quality characteristics in the design of UV facilities.²

¹ *Ultraviolet Disinfection Guidance Manual For The Final Long Term 2 Enhanced Surface Water Treatment Rule, USEPA, November, 2006.*

² To determine the levels of organic constituents in filtered or unfiltered samples and specific ultraviolet absorbance (SUVA), use method 10054, Organic Constituents UV Absorbing.




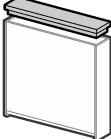
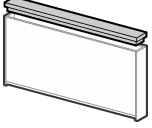
Test preparation

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	1-cm sample cell	5-cm sample cell	10-cm sample cell
DR 6000	LZV902.99.00020 (1-cm, 5-cm sample cells) LZV902.99.00002 (1-cm carousel) LZV887 (10-cm sample cell)	The clear side is to the right.	2624410 	2624450 	2624401 
DR 5000	A23618 (1-cm, 5-cm sample cells) LZY421 (10-cm sample cell)	The clear side is toward the user.			

Before starting

Do not filter the sample.

Do not adjust the sample pH.

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.

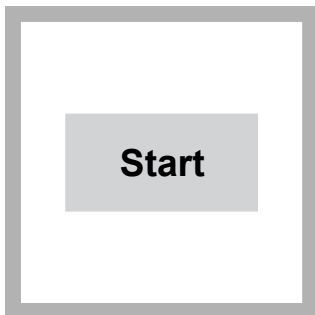
Items to collect

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

Sample collection

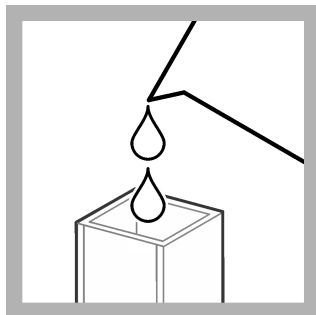
- Collect samples in clean glass bottles.
- Rinse the sample bottle several times with the sample to be collected.
- Analyze the samples as soon as possible for best results.
- Collect the sample from a moving water source or from a well-mixed water sampling point.
- Collect samples for calibration of UVT analyzers from a sampling point as near to the instrument as possible.

Test procedure

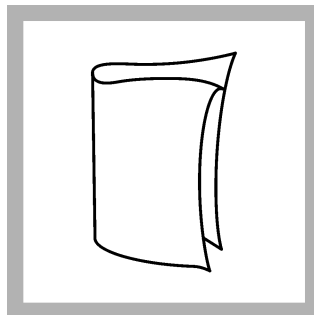


1. Start program **411 UV254, 1-cm (%T)**, **412 UV254, 5-cm (%T)** or **413 UV254, 10-cm (%T)**. For information about sample cells, adapters or light shields, refer to [Instrument-specific information](#) on page 1.

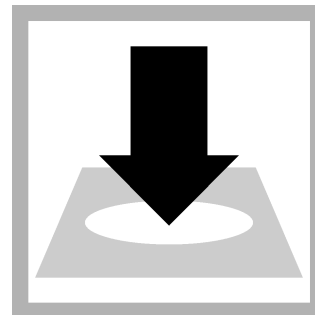
Note: Although the program name can be different between instruments, the program number does not change.



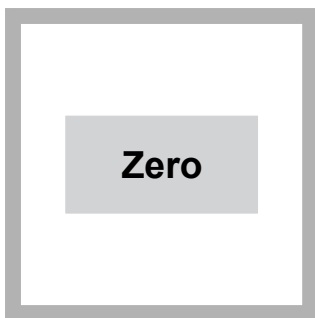
2. **Prepare the blank:** Rinse the sample cell several times with organic-free reagent water. Fill the sample cell with organic-free reagent water.



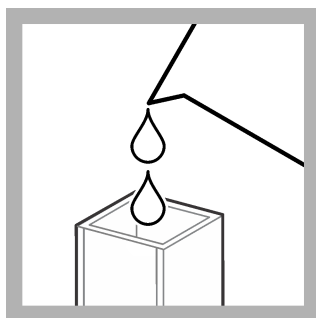
3. Clean the blank sample cell.



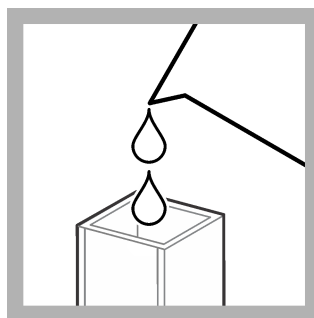
4. Insert the blank into the cell holder.



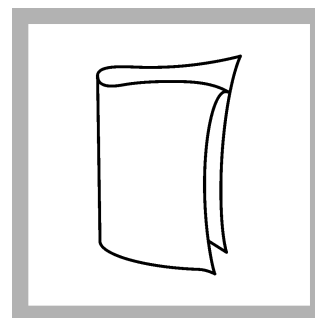
5. Push **ZERO**. The display shows 100 %T/cm and %T (1, 5 or 10 cm). If necessary, wait 2 to 3 minutes for the Lamp Warm Up to complete.



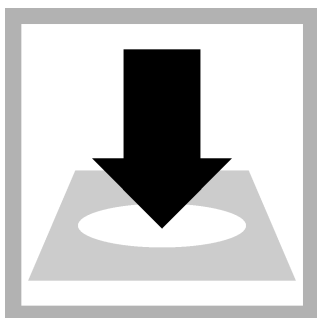
6. Discard the contents of the blank sample cell. Rinse the sample cell several times with the sample.



7. Fill the sample cell with the sample.



8. Clean the sample cell.



9. Insert the sample cell into the cell holder.



10. Push **READ**. Results show in transmittance per centimeter (%T/cm). If the result is more than 90% when a 1-cm sample cell is used with program 411, do the test procedure again with a 5-cm or 10-cm sample cell. When a 5-cm or 10-cm sample cell is used, the results are automatically adjusted to %T/cm.



Interferences

Table 2 shows the substances that interfere with the test. The remaining amounts of individual treatment chemicals (e.g., alum, aluminum, ammonia, ammonium, ferric and ferrous iron, calcium, magnesium, hydroxide, hypochlorite, phosphate, sulfite and zinc) typically interfere very little.

Table 2 Interfering substances

Interfering substance	Interference level
Ozone	Negative interference. Remove with bisulfite. Do not remove with sodium thiosulfate because it absorbs at 254 nm.
Oxidants (ozone and chlorine)	Positive interference. Degrades the natural organic matter, which decreases soluble materials and precipitating metals.

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 Chromic Acid Cleaning Solution for a maximum of 12 hours.
2. Rinse the sample cells 10 times or more with organic-free reagent water.

Summary of method

The sample water (without filtration) is measured in a spectrophotometer at 254 nm. Organic-free reagent water is used for the blank sample cell. The decrease in transmission (%T) is used to identify the amount of organic and inorganic constituents and particles in the sample water. The results (in %T/cm) are typically referred to as UV

transmission (UVT). The UVT is used to set the UV lamp output for disinfection systems with continuous-flow UV reactors.

The USEPA recommends that the UVT measurement from an online analyzer be compared to the UVT measurement from a laboratory spectrophotometer at least one time each week.

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.
Cell holder for 10-cm sample cells (DR 5000 only)	1	each	LZY421
Cell holder for 10-cm sample cells (DR 6000 only)	1	each	LZV887
Sample cell, 1-cm quartz	1	each	2624410
Sample cell, 5-cm quartz	1	each	2624450
Sample cell, 10-cm quartz	1	each	2624401

Optional reagents and apparatus

Description	Unit	Item no.
Chromic Acid Cleaning Solution	500 mL	123349
Sample cells, 1-cm quartz matched pair	each	4822800
Wipes, disposable	280/pkg	2097000



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