Nitrate, UV Screening

DOC316.53.01072

UV Screening Method[1]

Method 10049

0.1 to 10.0 mg/L NO_3^-–N

Scope and application: For the screening of uncontaminated natural and potable water supplies containing low concentrations of organic matter.

[1] Adapted from *Standard Methods for the Examination of Water and Wastewater*, part 4500-NO_3–B.

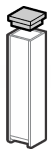
Test preparation

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.	4822800 
DR 5000	A23618	The clear side is toward the user.	

Before starting

Filter samples that are turbid with filter paper and a funnel.
Use only quartz sample cells for this test.
Use the Standard Adjust option with each instrument for the best results. Refer to the Standard solution method in Accuracy check on page 3.
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
Hydrochloric Acid Standard Solution, 1.0 M	1 mL
Water, deionized	10 mL
Beaker, 100-mL	1
Sample cells (For information about sample cells, adapters or light shields, refer to Instrument-specific information on page 1.)	2

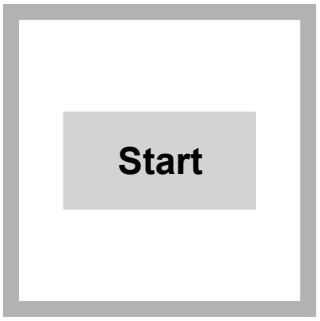
Refer to Consumables and replacement items on page 4 for order information.

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Sample collection and storage

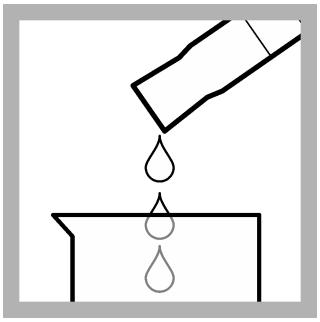
- Collect samples in clean glass or plastic bottles.
- To preserve samples for later analysis, adjust the sample pH to less than 2 with concentrated sulfuric acid (approximately 2 mL per liter). No acid addition is necessary if the sample is tested immediately.
- Keep the preserved samples at or below 6 °C (43 °F) for a maximum of 24 hours.
- Let the sample temperature increase to room temperature before analysis.
- Before analysis, adjust the pH to 3–5 with 5 N sodium hydroxide solution.
- Correct the test result for the dilution caused by the volume additions.

Test procedure

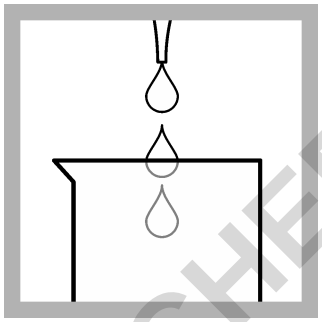


1. Start program **357 N Nitrate UV**. For information about sample cells, adapters or light shields, refer to Instrument-specific information on page 1.

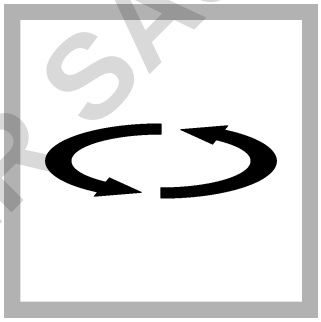
Note: *Although the program name can be different between instruments, the program number does not change.*



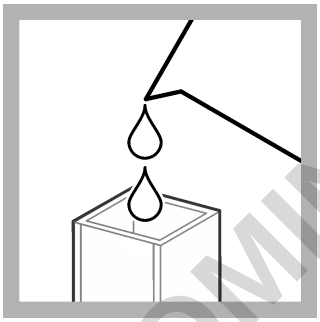
2. Prepare the sample: Collect 50 mL of sample in a 100-mL beaker.



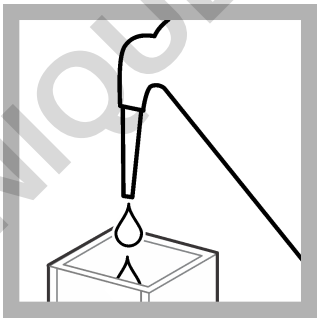
3. Add 1 mL of 1.0 N Hydrochloric Acid Standard Solution to the beaker.



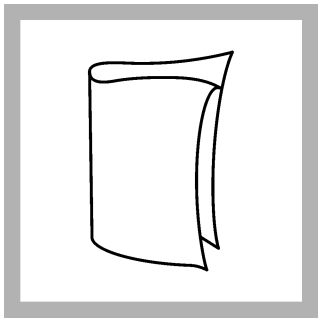
4. Swirl to mix.



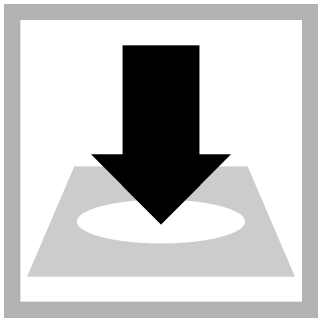
5. Rinse and fill the sample cell with sample. Discard the remaining sample.



6. Prepare the blank: Fill a second sample cell with deionized water.

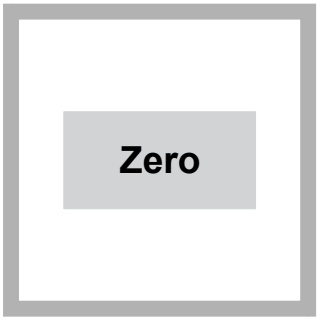


7. Clean the blank sample cell.

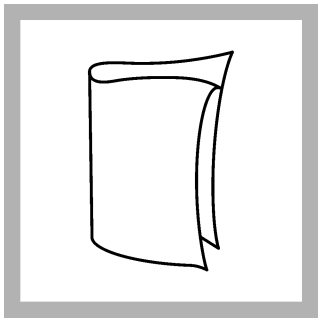


8. Insert the blank into the cell holder.

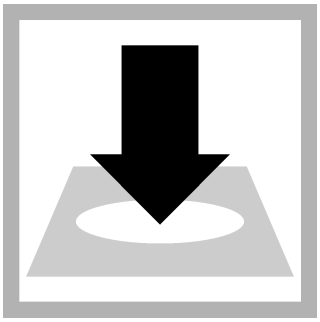
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9. Push **ZERO**. The display shows 0.0 mg/L NO_3^-–N.



10. Clean the prepared sample cell.



11. Insert the prepared sample into the cell holder.



12. Push **READ**. Results show in mg/L NO_3^-–N.

Interferences

Interfering substance	Interference level
Chlorate	May interfere
Chromium	Interferes at all levels
Dissolved organic matter	Interferes at all levels
Hydroxide and carbonate	Hydroxide and carbonate interference at concentrations less than 1000 mg/L is removed by the addition of hydrochloric acid during the test procedure.
Nitrite	Interferes at all levels
Surfactants	Interferes at all levels
Suspended particulate matter	Remove with filtration

Accuracy check

Standard solution method

Use the standard solution method to validate the test procedure, the reagents and the instrument.

Items to collect:

- Nitrate Nitrogen Standard Solution, 100 mg/L NO_3^-– N or Nitrate Nitrogen Voluette Ampul Standard, 5.0 mg/L
- 100-mL volumetric flask, Class A
- 5-mL volumetric pipet, Class A and pipet filler
- Deionized water

1. Prepare a 5.0 mg/L nitrate-nitrogen standard solution as follows:
   a. Use a pipet to add 5.0 mL of 100 mg/L nitrate-nitrogen standard solution into the volumetric flask.
   b. Dilute to the mark with deionized water. Mix well. Prepare this solution daily.
2. Use the test procedure to measure the concentration of the prepared standard solution.
3. Compare the expected result to the actual result.

   Note: *The factory calibration can be adjusted slightly with the standard adjust option so that the instrument shows the expected value of the standard solution. The adjusted calibration is then used for all test results. This adjustment can increase the test accuracy when there are small variations in the reagents or instruments.*

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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
357	5.0 mg/L NO_3^-–N	4.9 to 5.1 mg/L NO_3^-–N	0.1 mg/L NO_3^-–N

Summary of method

The first measurement is done at 220 nm. Nitrate and organic matter absorb light at 220 nm. The second measurement is done at 275 nm. Nitrate does not absorb at 275 nm. The second measurement is used to correct for the absorbance caused by the organic matter. Hydrochloric acid is added in the test procedure to prevent interference from hydroxide or carbonate ions. This method is not recommended for samples that contain high concentrations of organic matter.

Consumables and replacement items

Required reagents

Description	Quantity/test	Unit	Item no.
Hydrochloric Acid Solution, 1.0 N	varies	1 L	2321353
Water, deionized	varies	4 L	27256

Required apparatus

Description	Quantity/test	Unit	Item no.
Beaker, 100-mL	1	each	50042H
Sample cells with cap, 1-cm quartz	2	2/pkg	4822800

Recommended standards

Description	Unit	Item no.
Nitrate Nitrogen Standard Solution, 100-mg/L NO_3-N	500 mL	194749
Nitrate Nitrogen Voluette Solution, 5-mg/L NO_3-N, 10 mL ampuls	16/pkg	2557810
Ampule Breaker, 10-mL Voluette® Ampules	each	2196800

Optional reagents and apparatus

Description	Unit	Item no.
Dropper, LDPE, 0.5 –1.0 mL	20/pkg	2124720
Flask, volumetric, Class A, 100-mL glass	each	1457442
Pipet filler, safety bulb	each	1465100
Pipet, serological, 2-mL	each	53236
Pipet, volumetric 5.00-mL	each	1451537
Sulfuric Acid, ACS	500 mL	97949

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