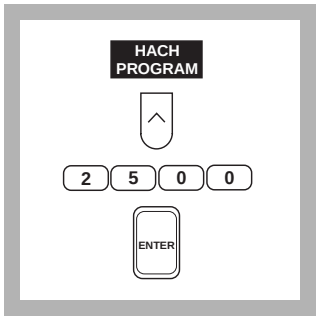
NITROGEN, Nitrate

Method 10049 **UV Direct Reading Method***

(0.0 to 10.2 mg/L NO_3^-–N)

Scope and Application: *For uncontaminated natural and potable water supplies containing low concentrations of organic matter. The estimated detection limit for program number 2500 is 0.2 mg/L NO_3^-–N.*

* Adapted from *Standard Methods for the Examination of Water and Wastewater*, 18th ed., part 4500, pages 4–87.



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

Select the stored program number for Nitrate, UV direct reading method, by pressing **2500** with the numeric keys.

Press: **ENTER**

2. The display will show:

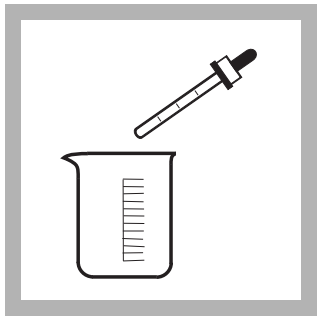
HACH PROGRAM: 2500 N, Nitrate

The wavelength (λ), **220 nm**, is automatically selected.

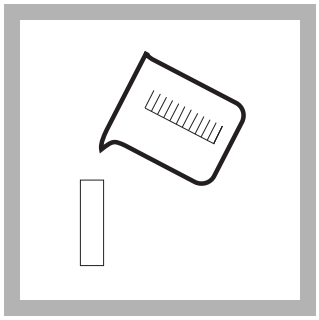
3. Collect 50 mL of clear sample in a 100-mL beaker.

Note: *Turbid samples must be filtered prior to analysis.*

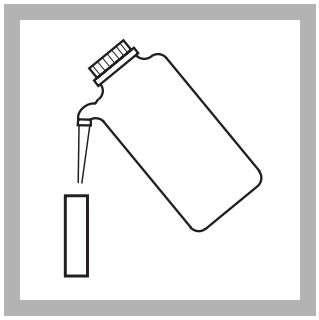
Note: *For proof of accuracy, use a 10.0 -g/L Nitrate Nitrogen Standard Solution in place of sample.*



4. Add 1 mL of 1.0 N Hydrochloric Acid Standard Solution to the beaker and swirl to mix.

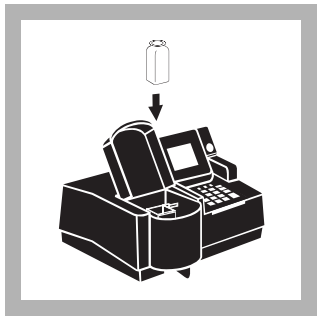


5. Fill a 1-cm quartz sample cell with sample. Discard the excess.

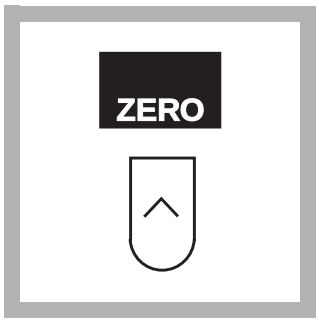


6. Fill a 1-cm quartz sample cell (the blank) with deionized water.

7. Insert the 1-cm Cell Adapter into the sample cell compartment.



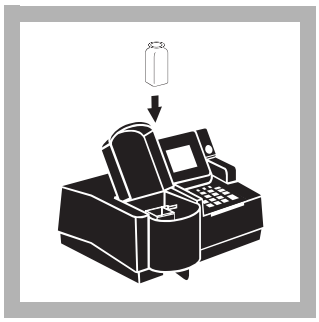
8. Place the blank into the cell holder and close the light shield.



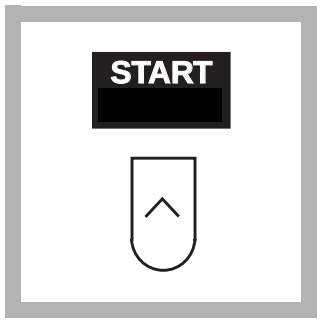
9. Press the soft key under ***ZERO***.

The instrument will zero at 220 nm and at 275 nm.

Note: *For alternate concentration units, press the soft key under* ***OPTIONS****. Then press the soft key under* ***UNITS*** *to scroll through the available options. Press* **ENTER** *to return to the read screen.*



10. When prompted, place the sample in the cell holder and close the light shield.



11. Press the soft key under ***START.***

The instrument will read the sample at 220 and 275 nm. When finished, the display will show the sample nitrate nitrogen concentration.

Note: *The results can be expressed as nitrate (NO_3^-). Press the soft keys under* ***OPTIONS****, then* ***FORM:*** *to scroll through the available options. Press* **ENTER** *to return to the read screen.*

Interferences

Interfering Substance	Interference Levels and Treatments
Chlorate	May interfere
Cr^{6+}	All levels
Dissolved organic matter	All levels
NO_2^-	All levels
Surfactants	All levels
Suspended particulate matter	Remove using filtration.

Sample Collection, Preservation and Storage

Most reliable results are obtained when samples are analyzed as soon as possible after collection. If prompt analysis is impossible, store samples in clean plastic or glass bottles for up to 24 hours at 4 °C. To preserve samples for longer periods, add 2 mL of concentrated sulfuric acid (H_2SO_4) per liter and store at 4 °C.

Accuracy Check

Standard Solution Method
To test accuracy, use a 10-mg/L Nitrate Nitrogen Standard Solution (44.3-mg/L as NO_3^-) in place of the sample and perform the procedure as described.

To adjust the calibration curve using the reading obtained with the 10.0 mg/L Nitrate Nitrogen Standard Solution, press the soft keys under ***OPTIONS, (MORE)*** then ***STD: OFF***. Press **ENTER** to accept the default concentration, 10.0 mg/L NO_3^-–N. If an alternate concentration is used, enter the actual concentration and press **ENTER** to return to the read screen. See Section *1.5.5 Adjusting the Standard Curve* for more information.

Method Performance

Precision
Standard: 10.0 mg/L NO_3^-–N

Program	95% Confidence Limits
2500	9.9–10.1 mg/L NO_3^-–N

For more information on determining precision data and method detection limits, refer to Section *1.5*.

Estimated Detection Limit

Program	EDL
2500	0.2 mg/L NO_3^-–N

For more information on derivation and use of Hach's estimated detection limit, see Section *1.5.2.* To determine a method detection limit (MDL) as defined by the 40 CFR part 136, Appendix B, see Section *1.5.1*.

Sensitivity
Program Number: 2470

Portion of Curve:	ΔAbs	ΔConcentration
0.010 Abs	0.010	0.04 mg/L NO_3^-–N
5.1 mg/L NO_3^-–N	0.010	0.04 mg/L NO_3^-–N
9.2 mg/L NO_3^-–N	0.010	0.06 mg/L NO_3^-–N

See Section *1.5.3 Sensitivity Explained* for more information.

Summary of Method

The UV nitrate direct screening method offers rapid determination of nitrate. Because both nitrate and organic constituents absorb at 220 nm and nitrate does not absorb at 275 nm, the second reading at 275 nm is used to correct for the absorbance attributed to organic matter. Although this method is useful for monitoring nitrate, it is not recommended for samples containing high concentrations of organics. Adding hydrochloric acid prevents interference from hydroxide or carbonate concentrations up to 1000 mg/L $CaCO_3$.

Safety

Good safety habits and laboratory techniques should be used throughout the procedure. Consult *Material Safety Data Sheets (MSDS)* for information specific to the standard used. For additional information, refer to Section *1*.

Pollution Prevention and Waste Management

For information on pollution prevention and waste management, refer to Section *1*.

REQUIRED REAGENTS AND STANDARDS

Description	Quantity Required Per Test	Unit	Cat. No.
Hydrochloric Acid Standard Solution, 1.0 M	1 mL	1 liter	23213-53
Water, deionized	10 mL	4 liters	272-56

REQUIRED EQUIPMENT AND SUPPLIES

Beaker, 100-mL	1	each	500-42
DR/4000 1-cm Cell Adapter	1	each	48584-00
Nitrate Nitrogen Standard Solution, 10-mg/L	varies	500 mL	307-49
Sample cells, 1-cm, quartz	2	each	26244-10

OPTIONAL REAGENTS AND STANDARDS

Sulfuric Acid, ACS, concentrated		500 mL	979-49

OPTIONAL EQUIPMENT AND SUPPLIES

Aspirator, Nalgene vacuum pump		each	2131-00
Filter Holder, 47-mm,		each	13529-00
Filter, membrane, 47-mm, 0.45 microns		100/pkg	13530-00
Flask, filtering, 500-mL		each	546-49
Pipet, serological, 2-mL		each	532-36
Stopper, No. 7, one-hole		6/pkg	2119-07
Tubing, rubber latex		12 ft	560-19

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