



Method 8311

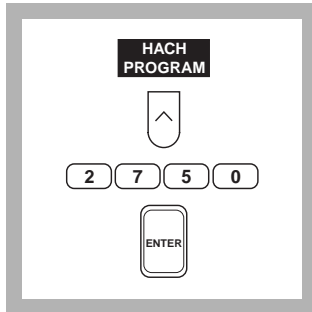
Indigo Method

AccuVac® Ampuls

(0 to 0.25 mg/L, 0 to 0.75 mg/L or 0 to 1.50 mg/L O₃)

Scope and Application: For water.

The estimated detection limit for program numbers 2750, 2760 and 2770 is 0.01 mg/L O₃.



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

Select the stored program number of the correct range of ozone (O₃) by pressing the numeric keys:

Range Number	Program
Low range	2750
Mid range	2760
High range	2770

Press: **ENTER**

Note: Samples must be analyzed immediately and cannot be preserved for later analysis.



2. The display will show:
**HACH PROGRAM: 2750
Ozone, LR AV**

**HACH PROGRAM: 2750
Ozone, LR AV**

or
**HACH PROGRAM: 2760
Ozone, MR AV**

**HACH PROGRAM: 2760
Ozone, MR AV**

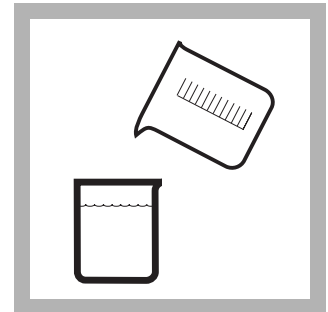
or
**HACH PROGRAM: 2770
Ozone, HR AV**

**HACH PROGRAM: 2770
Ozone, HR AV**

The wavelength (λ), **600 nm**, is automatically selected.



3. Insert the AccuVac Ampul Adapter into the sample cell module by sliding it under the thumb screw and into the alignment grooves. Fasten with the thumb screw.



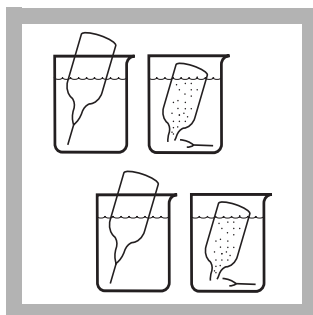
4. Gently collect at least 40 mL of sample in a 50-mL beaker.

Note: See *Sample Collection, Storage and Preservation for proper collection*.



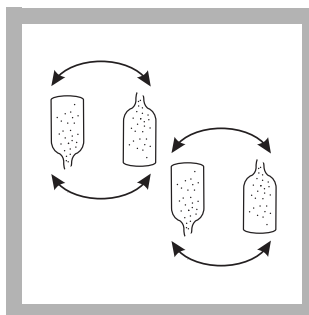
5. Collect at least 40 mL of ozone-free water (blank) in another 50-mL beaker.

Note: Ozone-free water used for the blank may be deionized water or tap water.



6. Fill one Indigo Ozone Reagent AccuVac Ampul with the sample and one Ampul with the blank.

Note: Keep the tip immersed while the ampul fills.

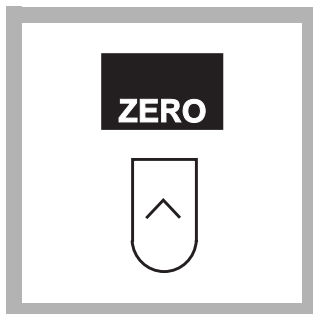


7. Quickly invert both ampuls several times to mix. Wipe off any liquid or fingerprints with a Kimwipe.

Note: Part of the blue color will be bleached if ozone is present.



8. Place the sample AccuVac Ampul into the cell holder. Close the light shield.



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

The display will show:

0.00 mg/L O₃

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. Place the AccuVac Ampul containing the blank into the cell holder. Close the light shield. Results in mg/L ozone (O₃) (or chosen units) will be displayed.

Note: The sequence of measuring blank and sample is reversed in this procedure.

Sample Collection, Storage and Preservation

The chief consideration when collecting a sample is to prevent the escape of ozone from the sample. The sample should be collected gently and analyzed immediately. Warming the sample, or disturbing the sample by stirring or shaking, will result in ozone loss. After collecting the sample, do not transfer it from one container to another unless absolutely necessary.

Stability of Indigo Reagent

Because indigo is light-sensitive, the AccuVac Ampuls should be kept in the dark at all times. The indigo solution, however, decomposes slowly under room light after filling with sample. The blank ampul can be used for multiple measurements during the same day.

Method Performance

Precision

Standard: 0.15 mg/L for program number 2750
 0.45 mg/L for program number 2760
 1.00 mg/L for program number 2770

Program	95% Confidence Limits
2750	0.14–0.16 mg/L O ₃
2760	0.44–0.46 mg/L O ₃
2770	0.99–1.01 mg/L O ₃

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

Estimated Detection Limit

Program	EDL
2750	0.01 mg/L O ₃
2760	0.01 mg/L O ₃
2770	0.01 mg/L O ₃

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: 2750

Portion of Curve	ΔAbs	ΔConcentration
Entire Range	0.010	0.011 mg/L

Program Number: 2760

Portion of Curve	ΔAbs	ΔConcentration
Entire Range	0.010	0.011 mg/L

Program Number: 2770

Portion of Curve	ΔAbs	ΔConcentration
Entire Range	0.010	0.011 mg/L

See Section 1.5.3 *Sensitivity Explained* for more information.

Summary of Method

The reagent formulation adjusts the sample pH to 2.5 after the ampul has filled. The indigo reagent reacts immediately and quantitatively with ozone. The blue color of indigo is bleached in proportion to the amount of ozone present in the sample. Other reagents in the formulation prevent chlorine interference. No transfer of sample is needed in the procedure. Therefore, ozone loss due to sampling is eliminated.

Safety

Good safety habits and laboratory techniques should be used throughout the procedure. Consult the *Material Safety Data Sheet* for information specific to the reagents 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		Cat. No.
	Per Test	Unit	
Select one or more Ozone AccuVac Ampuls based on range:			
0–0.25 mg/L.....	2 ampuls	25/pkg.....	25160-25
0–0.75 mg/L.....	2 ampuls	25/pkg.....	25170-25
0–1.50 mg/L.....	2 ampuls	25/pkg.....	25180-25

REQUIRED EQUIPMENT AND SUPPLIES

DR/4000 AccuVac Ampul Adapter.....	1	each.....	48187-00
Beaker, 50-mL.....	2	each.....	500-41

OPTIONAL EQUIPMENT AND SUPPLIES

AccuVac Snapper		each.....	24052-00
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