



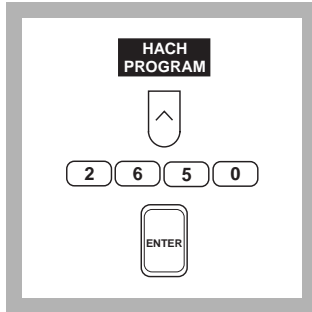
Method 8316

Indigo Carmine Method

AccuVac® Ampuls

LR (0 to 1000 µg/L O₂)

Scope and Application: For boiler feedwater. The estimated detection limit for program number 2650 is 10 µg/L.



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

Select the stored program number for low range dissolved oxygen by pressing **2650** with the numeric keys.

Press: **ENTER**

Note: Samples must be analyzed on site and cannot be stored; see Sample Collection, Preservation and Storage following this procedure.



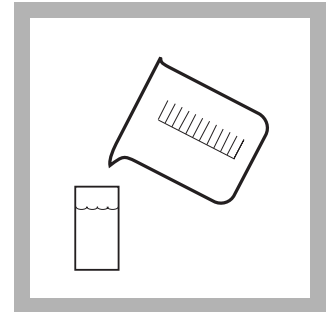
2. The display will show:

**HACH PROGRAM: 2650
O, Dissol. LR AV**

The wavelength (λ), **610 nm**, is automatically selected.



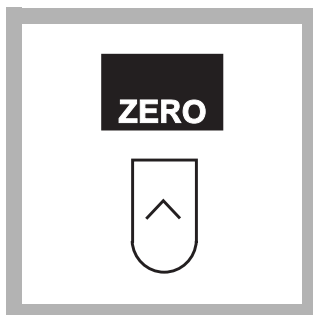
3. Insert the AccuVac Ampul Adapter into the sample cell module by sliding it under the thumb screw and into the alignment grooves. Fasten with the thumb screw.



4. Fill a zeroing vial (the blank) with at least 10 mL of sample.



5. Place the blank into the cell holder. Close the light shield.



6. Press the soft key under **ZERO**.
The display will show:

0 µg/L O₂

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.



7. Fill a Low Range Dissolved Oxygen AccuVac Ampul with sample.

Note: Keep the tip immersed while the ampul fills completely.

Note: One measure of accuracy is to verify the zero concentration of the blank. Follow the steps given in the Accuracy Check.

Note: The ampuls will contain a small piece of wire to maintain reagent quality. The solution color will be yellow.



8. Immediately place the AccuVac Ampul into the vial adapter. Close the light shield. Result in µg/L dissolved oxygen (or chosen units) will be displayed.

Note: Use the initial reading. The reading is stable for 30 seconds. After 30 seconds, the ampul solution will absorb oxygen from the air.

Interferences

Interfering Substance	Interference Level and Treatment
Hydrazine	100,000 fold excess will begin to reduce the oxidized form of the indicator solution.
Sodium hydrosulfite	Reduces the oxidized form of the indicator solution and will cause a significant interference

Excess amounts of thioglycolate, ascorbate, ascorbate + sulfite, ascorbate + cupric sulfate, nitrite, sulfite, thiosulfate, and hydroquinone will not reduce the oxidized form of the indicator and do not cause significant interference.

Sample Collection, Preservation and Storage

The main consideration in this procedure is to prevent contaminating the sample with atmospheric oxygen. Sampling from a stream of water that is hard plumbed to the sample source is ideal. Use a funnel to maintain a continual flow of sample and yet collect enough sample to immerse the ampul. It is important not to introduce air in place of the sample. Rubber tubing, if used, will introduce unacceptable amounts of oxygen into the sample unless the length of tubing is minimized and the flow rate is maximized. Flush the sampling system with sample for at least 5 minutes.

Accuracy Check

The reagent blank for this test can be checked by following these steps:

- a. Fill a 50-mL beaker with sample and add approximately 50 mg Sodium Hydrosulfite.
- b. Immerse the tip of a Low Range Dissolved Oxygen AccuVac Ampul in the sample into the tip. Aspirate the sample into the ampul.
- c. Determine the dissolved oxygen concentration according to the preceding procedure. The result should be $0 \pm 1 \mu\text{g/L}$.

Method Performance

Precision

Standard: 500 $\mu\text{g/L O}_2$

Program	95% Confidence Limits
2650	499–501 $\mu\text{g/L O}_2$

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

Estimated Detection Limit

Program	EDL
2650	10 $\mu\text{g/L O}_2$

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: 2650

Portion of Curve	ΔAbs	$\Delta\text{Concentration}$
Entire Range	0.010	7.0 $\mu\text{g/L}$

See Section 1.5.3 *Sensitivity Explained* for more information.

Summary of Method

The Low Range Dissolved Oxygen AccuVac Ampul contains reagent vacuum sealed in a 12-mL ampul. When the AccuVac Ampul is broken open in a sample containing dissolved oxygen, the yellow solution will turn blue. The blue color development is proportional to the concentration of dissolved oxygen.

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.

OXYGEN, Dissolved, continued

REQUIRED REAGENTS AND STANDARDS

Description	Quantity Required per test	Unit	Cat. No.
Low Range Dissolved Oxygen AccuVac Ampuls	1	25/pkg.....	25010-25

REQUIRED EQUIPMENT AND SUPPLIES

DR/4000 AccuVac Ampul Adapter.....	1	each.....	48187-00
Sample Cell, 10-mL with cap (zeroing vial).....	1	each.....	21228-00

OPTIONAL REAGENTS AND EQUIPMENT

Beaker, 50-mL.....		each.....	500-41
Sodium Hydrosulfite, technical-grade.....		500 g.....	294-34



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