

Bismuth Nitrate Method
0 to 40.0 mg/L as Na₄ EDTA

Method 8350
Digital Titrator

Scope and application: For industrial waters.



Test preparation

Before starting

Before the test procedure, rinse labware with a 1:1 HCl solution to remove hardness on the plastic or glass. Rinse several times with deionized water.

For the best results, measure the reagent blank value for each new lot of reagent. Replace the sample with deionized water in the test procedure to determine the reagent blank value. Subtract the number of digits used for the reagent blank from the number of digits used for the sample titration.

The optional TitraStir Titration Stand can hold the Digital Titrator and stir the sample.

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

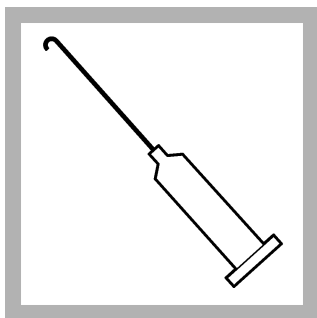
Description	Quantity
Methylthymol Blue Indicator Powder Pillow	1
Ascorbic Acid Powder Pillow	1
Bismuth Nitrate Titration Cartridge, 0.0200 M	1
Sulfuric Acid Standard Solution, 5.25 N	varies
Digital Titrator	1
Delivery tube for Digital Titrator	1
Graduated cylinder, 100-mL	1
Erlenmeyer flask, 125-mL	1

Refer to [Consumables and replacement items](#) on page 3 for order information.

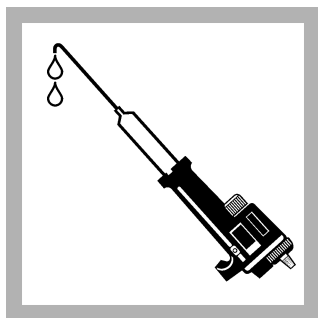
Sample collection

- Collect samples in clean glass or plastic bottles.
- Filter samples that are turbid with filter paper and a funnel.

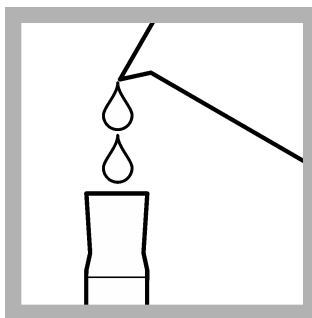
Test procedure



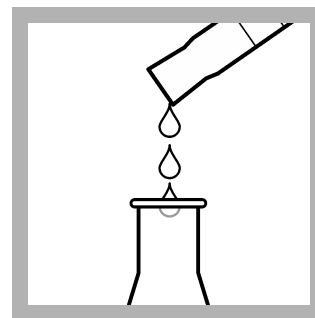
1. Insert a clean delivery tube into the digital titration cartridge. Attach the cartridge to the Digital Titrator.



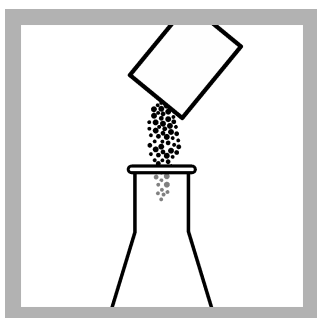
2. Hold the Digital Titrator with the cartridge tip up. Turn the delivery knob to eject air and a few drops of titrant. Reset the counter to zero and clean the tip.



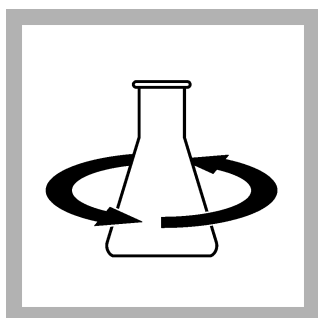
3. Use a graduated cylinder to measure 50 mL of sample.



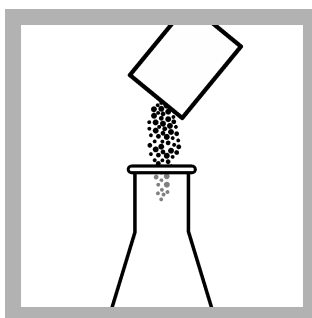
4. Pour the sample into a clean, 125-mL Erlenmeyer flask.



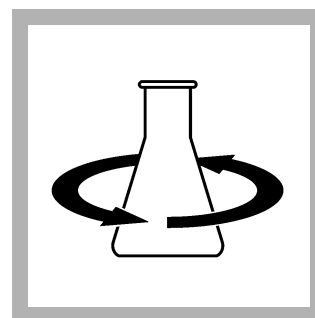
5. Add the contents of one Ascorbic Acid Indicator Powder Pillow.



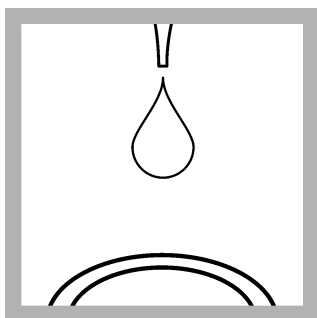
6. Swirl to mix.



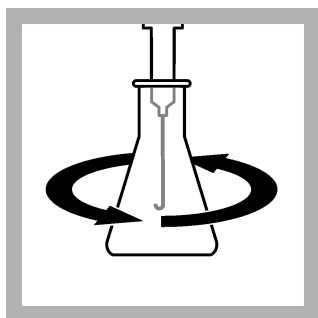
7. Add the contents of one Methylthymol Blue Indicator Powder Pillow.



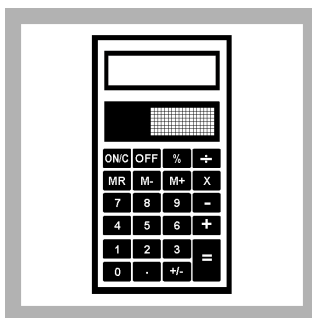
8. Swirl to mix.



9. If the solution is yellow, add 1 drop of 5.25 N Sulfuric Acid Standard Solution. If the solution changes to blue, add 5.25 N Sulfuric Acid Standard solution 1 drop at a time until the color changes to yellow. Then, add 1 more drop.



10. Put the end of the delivery tube fully into the solution. Swirl the flask. Turn the knob on the Digital Titrator to add titrant to the solution. Continue to swirl the flask. Add titrant until the color changes from yellow to a blue-green color. Record the number of digits on the counter.



11. Calculate the concentration. $\text{Digits used} \times 0.188 = \text{mg/L total chelant as Na}_4\text{EDTA}$.
Example: A 50-mL sample was titrated with the 0.0200 M cartridge and the counter showed 120 digits at the endpoint. The concentration is $120 \times 0.188 = 22.6 \text{ mg/L as Na}_4\text{EDTA}$.

Interferences

The addition of ascorbic acid decreases the interference from ferric iron (Fe^{3+}). The ascorbic acid changes the ferric iron to ferrous iron. Titrate slowly in samples that contain ferric iron because the ferrous iron decreases the sharpness of the color change.

Summary of method

A methylthymol blue indicator is added to the sample. The acidic sample is titrated with bismuth nitrate. The endpoint is determined by a color change from yellow to blue-green.

Consumables and replacement items

Required reagents

Description	Quantity/Test	Unit	Item no.
Ascorbic Acid Powder Pillows	1 pillow	100/pkg	1457799
Bismuth Nitrate Titration Cartridge, 0.0200 M	varies	each	2434501
Methylthymol Blue Indicator Powder Pillows	1 pillow	100/pkg	2284799
Sulfuric Acid Standard Solution, 5.25 N	varies	100 mL MDB	244932

Required apparatus

Description	Quantity/test	Unit	Item no.
Cylinder, graduated, 100-mL	1	each	50842
Digital Titrator	1	each	1690001
Delivery tube for Digital Titrator, J-hook tip	1	5/pkg	1720500
Flask, Erlenmeyer, 125 mL	1	each	50543

Optional reagents and apparatus

Description	Unit	Item no.
Filter paper, 2–3-micron, pleated, 12.5-cm	100/pkg	189457
Funnel, poly, 65-mm	each	108367
Bottle, sampling, with cap, low density polyethylene, 250-mL	12/pkg	2087076
Clippers	each	96800
Water, deionized	500 mL	27249
Stir bar, octagonal	each	2095352
TitraStir® Titration Stand, 115 VAC	each	1940000
TitraStir® Titration Stand, 230 VAC	each	1940010
Delivery tube for Digital Titrator, 90-degree bend for use with TitraStir Titration Stand	5/pkg	4157800



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