

Method 8207

Silver Nitrate Method

Digital Titrator

(10 to 10,000 mg/L as Cl⁻)

Scope and Application: For water, wastewater, and seawater



Tips and Techniques

- For added convenience when stirring, use the TitraStir® apparatus (Cat. No. 19400-00, -10).
- mg/L sodium chloride = mg/L chloride x 1.65
- meq/L chloride = mg/L chloride ÷ 35.45

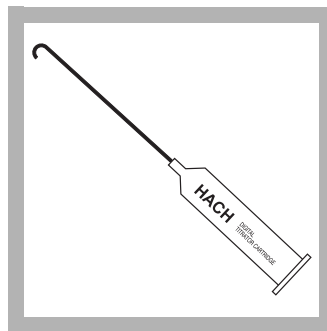


Digital Titration

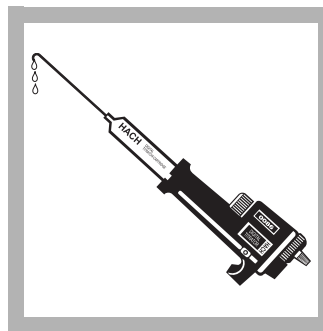
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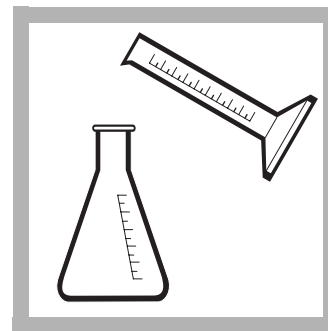
1. Select the sample volume and Silver Nitrate Titration Cartridge that corresponds to the expected chloride concentration from *Table 1*.



2. Insert a clean delivery tube into the titration cartridge. Attach the cartridge to the titrator body.

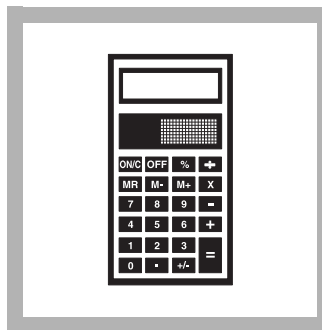
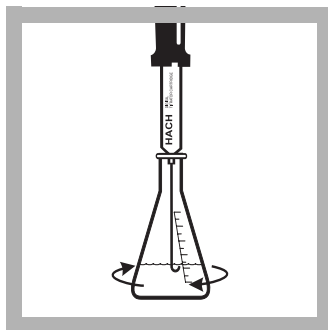
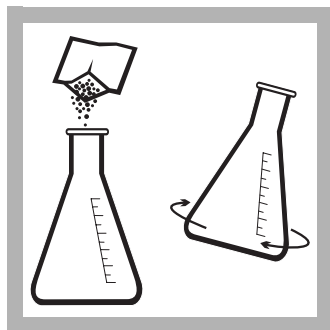


3. Hold the Digital Titrator with the cartridge tip pointing up. Turn the delivery knob until a few drops of titrant are expelled. Reset the counter to zero and wipe the tip.



4. Use a graduated cylinder or pipet to measure the sample volume from *Table 1*. Transfer the sample into a clean 250-mL Erlenmeyer flask. Dilute to about the 100-mL mark, if necessary.

Chloride



5. Add the contents of one Chloride 2 Indicator Powder Pillow and swirl to mix.

Results will still be accurate if a small amount of powder does not dissolve.

6. Place the delivery tube tip into the solution and swirl the flask while titrating with silver nitrate from a yellow to red-brown color. Record the number of digits required.

7. Calculate:

Digits Required x
Digit Multiplier = mg/L Chloride

Table 1

Range (mg/L as Cl ⁻)	Sample Volume (mL)	Titration Cartridge (N AgNO ₃)	Catalog Number	Digit Multiplier
10-40	100	0.2256	14396-01	0.1
25-100	40	0.2256	14396-01	0.25
100-400	50	1.128	14397-01	1.0
250-1000	20	1.128	14397-01	2.5
1000-4000	5	1.128	14397-01	10.0
2500-10,000	2	1.128	14397-01	25.0

Sampling and Storage

Collect at least 100 to 200 mL of sample in a clean glass or polyethylene container. Samples may be stored up to 7 days before analysis.

Accuracy Check

Standard Additions Method (Sample Spike)

This accuracy check should be performed when interferences are suspected or to verify analytical technique.

1. Snap the neck off a Chloride Voluette Ampule Standard, 12,500-mg/L Cl⁻.
2. Use a TenSette Pipet to add 0.1 mL of standard to the sample after titration in *step 6*. Resume titration back to the same end point. Record the number of digits required.
3. Repeat, using additions of 0.2 and 0.3 mL. Titrate to the end point after each addition.
4. Each 0.1 mL addition of standard should require 12.5 additional digits of 2.256 N titrant, 25 digits of 1.128 N titrant and 125 digits of 0.2256 N titrant. If these uniform increases do not occur, see *Section 3.2.2 Standard Additions* on page 46.

Interferences

- Iron in excess of 10 mg/L masks the end point.
- Orthophosphate in excess of 25 mg/L will precipitate the silver.
- Sulfite in excess of 10 mg/L interferes. Eliminate sulfite interference by adding three drops of 30% hydrogen peroxide (Cat. No. 144-45) in *step 4*.
- Remove sulfide interference by adding the contents of one Sulfide Inhibitor Reagent Powder Pillow (Cat. No. 2418-99) to about 125 mL of sample, mixing for one minute, and filtering through a folded Filter Paper (Cat. No. 1894-57).
- Cyanide, iodide and bromide interfere directly and titrate as chloride.
- Neutralize strongly alkaline or acid samples to a pH of 2 to 7 with 5.25 N Sulfuric Acid Standard Solution (Cat. No. 2449-32) or 5.0 N Sodium Hydroxide Standard Solution (Cat. No. 2450-32). Determine the amount of acid or base necessary in a separate sample because pH electrodes will introduce chloride into the sample.

Summary of Method

The sample is titrated with Silver Nitrate Standard Solution in the presence of potassium chromate (from the Chloride 2 Indicator Powder). The silver nitrate reacts with the chloride present to produce insoluble white silver chloride. After all the chloride has been precipitated, the silver ions react with the excess chromate present to form a red-brown silver chromate precipitate, marking the end point of the titration.

Required Reagents

Description	Cat. No.
Silver Nitrate Chloride Reagent Set (about 50 tests)	22880-00
Includes:	
(2) Chloride 2 Indicator Powder Pillows	50/pkg.....1057-66
(1) Silver Nitrate Titration Cartridge, 0.2256 N	each.....14396-01
(1) Silver Nitrate Titration Cartridge, 1.128 N	each.....14397-01
Water, deionized	4 L272-56

Required Apparatus

Digital Titrator.....	each.....16900-01
Select one or more based on sample concentration	
Cylinder, graduated, 10-mL	each.....508-38
Cylinder, graduated, 25-mL	each.....508-40
Cylinder, graduated, 50-mL	each.....508-41
Cylinder, graduated, 100-mL	each.....508-42
Flask, Erlenmeyer, 250-mL	each.....505-46

Required Standards

Chloride Standard Solution, Voluette [®] Ampule, 12,500-mg/L Cl ⁻ , 10-mL	16/pkg.....14250-10
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FOR TECHNICAL ASSISTANCE, PRICE INFORMATION AND ORDERING:

In the U.S.A. – Call toll-free 800-227-4224

Outside the U.S.A. – Contact the HACH office or distributor serving you.

On the Worldwide Web – www.hach.com; E-mail – techhelp@hach.com

HACH COMPANY
WORLD HEADQUARTERS
Telephone: (970) 669-3050
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