

## Methods

Chloride is the most common inorganic anion found in water and wastewater. The Maximum Secondary Contaminant Level for drinking water for chloride is 250 mg/L. Natural sources of salt are the ocean and various salt deposits above and below ground.

Chloride is very corrosive to most metals in systems with elevated pressures and temperatures such as boilers and oil-drilling equipment.

### The Mercuric Nitrate Method

References: APHA Standard Methods, 21<sup>st</sup> ed., Method 4500-Cl<sup>-</sup> C (2005). ASTM D 512-04, Chloride Ion in Water, Test Method A. USEPA Methods for Chemical Analysis of Water and Wastes, Method 325.3 (1983).

CHEMetrics employs a mercuric nitrate titrant in acid solution with diphenylcarbazone as the end point indicator. Results are expressed as ppm (mg/L) Cl<sup>-</sup>.

### The Ferric Thiocyanate Method

Reference: APHA Standard Methods, 21<sup>st</sup> ed., Method 4500-Cl<sup>-</sup> E (2005). D. Zall, D. Fisher, M. Garner, "Photometric Determination of Chlorides in Water," *Analytical Chemistry*, Vol 28, No. 11, pp. 1665-1668, November 1956. J. O'Brien, "Automatic Analysis of Chlorides in Sewage," *Wastes Engineering*, pp. 670-672, December 1962.

The Chloride Vacu-vials<sup>®</sup> test employs the ferric thiocyanate chemistry. Chloride reacts with mercuric thiocyanate to liberate thiocyanate ion. Ferric ion reacts with thiocyanate ion to produce an orange-brown thiocyanate complex in proportion to the chloride concentration. Results are expressed as ppm (mg/L) Cl<sup>-</sup>.

## Visual Kits

**Range: 2-20 ppm**  
MDL: 2.0 ppm / Method: Mercuric Nitrate

**Titrets Kit**, Shelf-life 6 months Cat#  
\*K-2002

Increments:  
2.0, 2.2, 2.4, 2.6, 2.8, 3.0, 3.2, 3.6, 4.0, 5.0, 6.0, 7.0, 8.0, 10, 14, 20 ppm

Kit comes in a cardboard box and contains everything needed to perform 30 tests: thirty ampoules with valve assemblies, Acidifier Solution, Normalizer Solution, titrettor, 25 mL sample cup, instructions, and MSDS.

**Range: 20-200 ppm**  
MDL: 20 ppm / Method: Mercuric Nitrate

**Titrets Kit**, Shelf-life 20 months Cat#  
\*K-2020

Increments:  
20, 22, 24, 26, 28, 30, 32, 36, 40, 50, 60, 70, 80, 100, 140, 200 ppm

Kit comes in a cardboard box and contains everything needed to perform 30 tests: thirty ampoules with valve assemblies, Activator Solution, titrettor, 25 mL sample cup, instructions, and MSDS.

**Range: 50-500 ppm**  
MDL: 50 ppm / Method: Mercuric Nitrate

**Titrets Kit**, Shelf-life 20 months Cat#  
\*K-2050

Increments:  
50, 55, 60, 65, 70, 75, 80, 90, 100, 125, 150, 175, 200, 250, 350, 500 ppm

Kit comes in a cardboard box and contains everything needed to perform 30 tests: thirty ampoules with valve assemblies, Activator Solution, titrettor, 25 mL sample cup, instructions, and MSDS.

\*Contains mercury. Dispose according to local, state or federal laws.



**Range: 250-2500 ppm**  
**MDL: 250 ppm / Method: Mercuric Nitrate**

**Cat#**  
\*K-2051

**Titrets Kit**, Shelf-life 20 months

Increments:  
 250, 275, 300, 325, 350, 375, 400, 450, 500, 625, 750, 875, 1000,  
 1250, 1750, 2500 ppm

Kit comes in a cardboard box and contains everything needed to perform 30 tests: thirty ampoules with valve assemblies, Activator Solution, titrettor, 25 mL sample cup, instructions, and MSDS.

**Range: 1000-10,000 ppm**  
**MDL: 1000 ppm / Method: Mercuric Nitrate**

**Cat#**  
\*K-2055

**Titrets Kit**, Shelf-life 20 months

Increments:  
 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1800, 2000, 2500, 3000, 3500,  
 4000, 5000, 7000, 10,000 ppm

Kit comes in a cardboard box and contains everything needed to perform 30 tests: thirty ampoules with valve assemblies, Activator Solution, titrettor, 25 mL sample cup, instructions, and MSDS.

**Range: 10,000-100,000 ppm**  
**MDL: 10,000 ppm / Method: Mercuric Nitrate**

**Cat#**  
\*K-2070

**Titrets Kit**, Shelf-life 20 months

Increments:  
 10,000, 11,000, 12,000, 13,000, 14,000, 15,000, 16,000, 18,000, 20,000,  
 25,000, 30,000, 35,000, 40,000, 50,000, 70,000, 100,000 ppm

Kit comes in a cardboard box and contains everything needed to perform 30 tests (except distilled water): thirty ampoules with valve assemblies, Activator Solution, titrettor, 25 mL sample cup, 3.0 mL syringe, instructions, and MSDS.

**Kit Components common to Chloride**

Description	Cat#
Sample Cup Pack, 25 mL (6 ea)	A-0013
Ampoule Blank Pack (5 ea)	A-0023
Syringe Pack, 1.0 mL (6 ea)	A-0027
Titrettor Pack (1 ea)	A-0053
Syringe Pack, 3.0 mL (6 ea)	A-0063

**Instructions are posted on our website.**  
*If no shelf-life is listed for a product, then the shelf-life is at least 2 years.*



 **Instrumental Kit**

**V-2000 Multi-Analyte Photometer**  
*(See page 12 for instrumental features)*

**Range: 2.5-40.0 ppm**  
**Method: Ferric Thiocyanate**

**Cat#**  
\*K-2103<sup>1</sup>

**Vacu-vials Kit**

Kit comes in a cardboard box and contains everything needed to perform up to 29 tests (except distilled water): thirty ampoules, Activator Solution, 25 mL sample cup, ampoule blank, 1.0 mL syringe, instructions, calibration table, and MSDS.

*Vacu-vials Kits require the use of the V-2000 Photometer or a spectrophotometer capable of accepting a 13 mm diameter round cell. Instrument sold separately.*

<sup>1</sup>Although the test kit contains 30 ampoules, a fresh reagent ampoule blank must be prepared for each series of tests; therefore, the number of samples that can be tested with each kit will vary from a maximum of 29 to a minimum of 15.

\*Contains mercury. Dispose according to local, state or federal laws.