



## Parameter

Chloride

## Sample Type

Wastewater

## Introduction

The ion-selective electrode method is an EPA-approved test procedure to directly read chloride in wastewater. Laboratory productivity is improved with quick, uncomplicated determinations. Interferences to the chloride measurement are minimized by addition of CISA reagent. This procedure conforms to EPA-approved test procedure from ASTM, as listed below.

## Reference

1. D512-04, (C). Annual Book of ASTM Standards, Section 11, Water and Environmental Technology, Volume 11.01, 2005. ASTM International, West Conshohocken, PA.  
[www.astm.org](http://www.astm.org)

## Result Statistics

# Trials	Average	%CV
4	194.0 mg/L	1.3%

## Recommended Equipment

5 Star-Benchtop pH/ISE/Cond/DO Meter (Orion 1119000) or other Orion ISE meter; ionplus® Sure-Flow® Combination Chloride Electrode (Orion 9617BNWP); benchtop stirrer (Orion 096019). Optional: printer (Orion 1010006); Star Navigator Software (Orion 1010007).

## Required Solutions

1000 ppm Chloride Standard (Orion 941708); Chloride Ionic Strength Adjuster, CISA, (Orion 940011); Filling Solution (Orion 900017); deionized water (DI).

## Solutions Preparation

*100mg/L chloride std:* pipette 10mL 1000ppm std into 100mL volumetric flask. Dilute to the mark with DI water.

*10mg/L chloride std:* pipette 10mL 100ppm std into 100mL volumetric flask. Dilute to the mark with DI water.

*1mg/L chloride std:* pipette 10mL 10ppm std into 100mL volumetric flask. Dilute to the mark with DI water.

## Meter Setup

Connect the electrode and stirrer to the meter. Set measurement mode to ISE. In Setup mode, set resolution to 3, units to mg/L, range to high, read type to continuous. If all steps were followed correctly, the meter display will show three digits in the top line and "ISE: mg/L" to the right of the top line. For other Orion ISE meters, see meter instruction manual.

## Electrode Setup

See the electrode manual for preparation of the electrode.

## Electrode Performance Check

Check slope at least daily according to the electrode manual. Drift may be checked by comparing a 1 minute to a 2 minute reading. Results should agree with desired criteria. See troubleshooting section of manual if slope or drift problems.

## Electrode Storage, Soaking, and Rinsing

See electrode manual for storage 1) between measurements, 2) overnight, and 3) for long periods of time. Before measurement, rinse the electrode with DI water.

## Sample Preservation

Preservation is not required. Maximum holding time is 28 days. Refer to reference and/or EPA 40 CFR Part 136.3 for details.

## Sample Preparation

For precise measurements, allow all the standards and the samples to reach the same temperature before analysis. Measure 10mL of sample and 10mL of CISA into a 50-mL beaker; stir thoroughly for 1 to 2 minutes. CISA must be added to all standards and samples. A larger sample size can be used if desired as long as CISA is added in a 1:1 ratio.

## Calibration

Perform four point calibration using 1, 10, 100, and 1000mg/L chloride standards. After calibration, the electrode slope will be displayed and should be above 54mV/decade. Analyze a mid-range standard to verify the calibration. If reading is not acceptable, see troubleshooting section of electrode manual.

## Analysis

Place electrode and stirrer in the prepared sample. Press STIRRER key to turn on stirrer. The "ISE:mg/L" icon will flash until the reading is stable. Press the MEASURE key to print and log the result. Press STIRRER key to turn off stirrer. Alternately, set read type to "auto" for automatic print and data log.

## Quality Control (QC)

Recommended QC procedures include: calibration and calibration verification, initial demonstration of laboratory capability and method detection limit determination, laboratory control samples (LCS), method blanks, matrix spikes (MS), sample duplicates, and independent reference materials. See reference above for details.



Waste Water	ppm (mg/L) Chloride
Sample 1	197.0
Sample 2	195.0
Sample 3	193.0
Sample 4	191.0
Mean	194.0
Standard Deviation	2.58
%CV	1.3%

