



## Parameter

Fluoride

## Sample Type

Drinking Water

## Introduction

The ion-selective electrode method is an EPA-compliant test procedure to directly read fluoride in drinking water. Laboratory productivity is improved with quick, uncomplicated determinations. Use of the TISAB buffer frees the ISE method from most interferences, eliminating the need for distillation of samples. This procedure conforms to EPA-approved test procedures from Standard Methods and ASTM, as listed below.

## References

1. Method 4500-F C. Standard Methods for the Examination of Water and Wastewater, 20<sup>th</sup> Edition, 1998. APHA, AWWA, & WEF, Washington, D.C. [www.standardmethods.org](http://www.standardmethods.org)
2. D1179-93,99. 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   |
|----------|-----------|-------|
| 9        | 1.01 mg/L | 1.8 % |

## Recommended Equipment

5-Star Benchtop pH/ISE/Cond/DO meter (Orion 1119000) or other Orion ISE meter; ionplus® fluoride electrode (Orion 9609BNWP); benchtop stirrer (Orion 096019). Optional: ATC probe (Orion 927007MD); printer (Orion 1010006); Star Navigator Software (Orion 1010007).

## Required Solutions

1 ppm (mg/L) F<sup>-</sup> with TISAB II (Orion 040906); 2 ppm (mg/L) F<sup>-</sup> with TISAB II (Orion 040907); Reference Filling Solution, Optimum Results™ A (Orion 900061); TISAB II (Orion 940909); deionized water (DI).

## Solutions Preparation

Prepare a 0.5 ppm fluoride standard with TISAB II by pipetting 50 mL of the 1 ppm fluoride standard (Orion 040906) and 25 mL of TISAB II into a 100 mL volumetric flask. Add DI water up to the mark.

## Meter Setup

Connect the electrode, stirrer and ATC probe to the Star Meter. Set measurement mode to ISE. In Setup mode, set resolution to 3, turn off the auto blank correction, set the range to low, select mg/L as the unit, and set 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. The temperature will also be displayed in the top left of the screen (if ATC is used). For other Orion ISE meters, see meter instruction

## 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. Between measurements, rinse the electrode with DI water and dry outer sleeve of electrode or shake to remove drops before measuring the next sample. Do not wipe or rub the sensing element of the electrode.

## Sample Preservation

No preservation required. Analyze within 28 days.

## Sample Preparation

In 50-mL or 100-mL plastic beakers add by volumetric pipette from 10 to 25 mL sample. Add an equal volume of TISAB II. All standards and samples should be measured at the same temperature, preferably at room temperature.

## Calibration

Perform a three point calibration using 0.5 mg/L, 1 mg/L, and 2 mg/L fluoride standards. The electrode slope will be displayed from calibration and should be between -54 and -60mV/decade. Read a fresh portion of a standard to verify calibration. If reading is not acceptable, see troubleshooting section of electrode manual.

## Analysis

Rinse electrode, ATC probe and stirrer with DI water and shake electrode to dry sensing element. Place all probes in sample, turn on stirrer and measure. The concentration of the sample will be displayed. When a stable reading is achieved, the "ISE:mg/L" icon will stop flashing.

## 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 references above for details.



| Fluoride Drinking Water | ppm (mg/L) Fluoride |
|-------------------------|---------------------|
| Sample 1                | 0.980               |
| Sample 2                | 1.01                |
| Sample 3                | 1.00                |
| Sample 4                | 1.04                |
| Sample 5                | 1.01                |
| Sample 6                | 1.01                |
| Sample 7                | 1.01                |
| Sample 8                | 1.01                |
| Sample 9                | 1.04                |
| Mean                    | 1.01                |
| Standard Deviation      | 0.02                |
| %CV                     | 1.83                |