perfectION™ Application

Water is Life

Low Level Fluoride in Pure Water

Fluoride at low levels in pure water is determined by direct measurement with the METTLER TOLEDO SevenMulti™ benchtop ion meter, SevenGo pro™ portable ion meter or any other meter with a mV mode. The calibration is accurate from 0.1–10 mg/L fluoride ion.

Required equipment

- ISE meter, such as the METTLER TOLEDO SevenMulti™ benchtop meter or the SevenGo pro™ portable meter or any meter with a mV mode
- perfectION™ combined fluoride ion selective electrode (P/N 51344715)
- Stirrer
- Volumetric flasks, graduated cylinders and beakers (plastic)
- Ion Electrolyte A Reference filling solution (P/N 51344750)
- Fluoride standards at 0.5, 1, 2, and 10 mg/L
  Fluoride standard solution 1000 mg/L (P/N 51344775). For serial dilution see electrode guidebook.
- TISAB II with CDTA (P/N 51344765)
- Deionized water (DI)

Electrode setup

See the electrode guidebook for (assembling and) preparation ofthe electrode.

Electrode performance check

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

Electrode storage, soaking, and rinsing

The electrode may be stored in a 4 mol/L potassium chloride solution with 1 mg/L fluoride between measurements and overnight. Do not add TISAB to the storage solution. For long periods of time, store dry. See electrode guidebook for details on dry storage. Between measurements, rinse the electrode with DI water and gently blot dry.

Meter setup

Connect the electrode to the meter and follow the meter user guide for

ion measurement. Select resolution of 3 digits, concentration units of mg/L (ppm), and manual endpoint format.

Sample preparation

For precise measurements, allow all standards and samples to reach room temperature before analysis.
Standards: measure 15 mL of each standard into a 50 mL beaker. Add 15 mL of TISAB II to the beaker for a total volume of 30 mL.
Samples: measure 15 mL sample into a 50 mL beaker. Add 15 mL TISAB II to the beaker for a total volume of 30 mL.

METTLER TOLEDO

Sample preservation

Collect fluoride samples in plastic. No sample preservation is required. A collected sample is valid for 28 days. Refer to EPA 40 CFR Part 136.3 for details.

Calibration

A three point calibration is performed at 1, 2, and 10 mg/L fluoride ion. Using this calibration, results are accurate to 0.1 mg/L.
Place the electrode into the 1 mg/L fluoride standard with TISAB II and stir. Allow electrode to stabilize until readings change by no more than 2% per minute (0.5 mV/min), which is 0.020 mg/L per minute in the 1 mg/L standard. Then begin the three point calibration, starting with the 1 mg/L standard, followed by the 2 and 10 mg/L standards. After calibration, the slope will be displayed and should be 54 mV/decade or higher. Check accuracy by reading the 0.5 mg/L standard. Results should be close to 0.5 mg/L, within the user-determined tolerance. See Table for typical results. If reading is not acceptable, see troubleshooting section of the electrode guidebook.

Analysis

Rinse electrode with DI water and blot dry. Place it in the prepared sample, and stir. A stable reading is usually achieved in 2–3 minutes. Verify that the sample has come to room temperature before recording the fluoride results. Record the fluoride value and the temperature.

Typical testing results

Fluoride conc. (mg/L)	Result (mg/L)	mV	Resp. time (min)	% of Result	Rel. standard deviation
1.0	1.0200	103.5	1.0	102%	1.3%
1.0	1.0400	103.0	1.5	104%	
1.0	1.0400	103.0	1.5	104%	
1.0	1.0500	102.5	1.5	105%	
0.5	0.5070	121.2	1.5	101%	3.2%
0.5	0.5230	120.4	2.0	105%	
0.2	0.1980	143.7	2.0	99%	4.5%
0.2	0.2070	142.8	2.0	104%	
0.1	0.0895	160.6	2.0	90%	3.0%
0.1	0.0917	160.1	1.5	92%	
0.1	0.0961	159.2	1.5	96%	
0.1	0.0947	159.5	3.0	95%	

Note: fluoride response was tested between 0.1 and 10 mg/L.
Calibration at 1, 2, and 10 mg/L gives accurate results down to 0.1 mg/L.

Mettler-Toledo AG, Analytical
CH-8603 Schwerzenbach, Switzerland
Phone +41-44-806 77 11
Fax +41-44-806 72 40
Internet www.mt.com

www.mt.com/pH
For more information