

Method Abstract

Summary:

Fluoride is determined potentiometrically using a fluoride-specific ion-selective electrode (ISE) with a sealed reference electrode in a double-junction configuration. The operation of the fluoride ISE is based upon the potential that develops across a crystal lanthanum fluoride membrane, which is proportional to the activity of fluoride ions contacting the membrane.

Interferences:

Most anions commonly associated with fluoride, such as chloride, bromide, iodide, sulfate, bicarbonate, nitrate, phosphate, and acetate, do not interfere with the electrode operation. Polyvalent cations of silicon(IV), iron(II), and aluminum(III) interfere by forming complexes with fluoride. Eliminate this interference by adding 1,2-cyclohexylenedinitrilotetraacetic acid monohydrate (CDTA) to the TISAB (total ionic strength adjusting buffer) to bind the complexing metal ions. Hydroxide ion is an electrode interferant. Anions such as carbonate and phosphate make the sample more basic, increasing the hydroxide interference. Eliminate this interference by buffering the sample to pH 5.0–5.5 using the TISAB. In solutions with pH <5, hydrogen ions combine with fluoride, forming a poorly ionized hydrogen fluoride complex (HF–HF). Buffer the sample to pH 5.0–5.5 to eliminate this interference. Since electrode potentials are affected by temperature changes, samples and standards should be as close as possible to the same temperature. A 1°C change in temperature can cause up to a 2% error in the fluoride results. The slope of the fluoride electrode also varies with temperature.

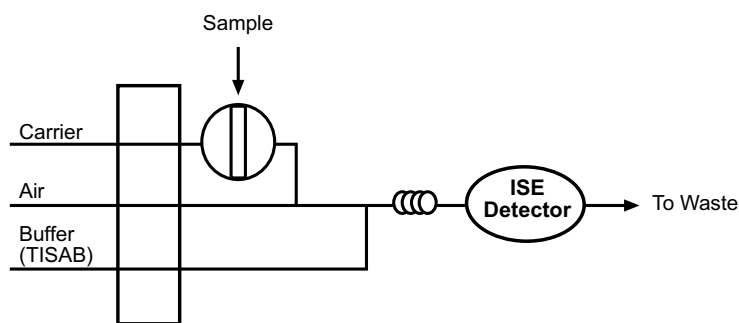
Performance Specifications:

Range:	0.20–8.0 mg/L
Throughput:	24 samples/hour
Precision:	
0.20 mg/L	<5% RSD
1.0 mg/L	<2% RSD
8.0 mg/L	<1% RSD
Method Detection Limit (MDL):	0.02 mg/L

Chemicals:

Acetic Acid, glacial, C ₂ H ₄ O ₂	Kleenflow™ Basic
Brij®-35, 30% w/v	(OI Analytical Part #A002294)
(OI Analytical Part #A21-0110-33)	Sodium Chloride, NaCl
1,2-Cyclohexylenedinitrilotetraacetic Acid Monohydrate (CDTA),	Sodium Fluoride, NaF
C ₆ H ₁₀ [N(CH ₂ CO ₂ H) ₂] ₂ •H ₂ O	Sodium Hydroxide, NaOH

Basic Flow Diagram:



Selected Reference:

Methods for Chemical Analysis of Water and Wastewater; EPA-600/4-79-020; U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory: Cincinnati, OH, 1984; Method 340.2.

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