1.14598.0001
1.14598.0002

Spectroquant®

Fluoride Test

F^-

1. Method

In a buffered, weakly acidic solution, fluoride ions react with alizarin complexone and lanthanum(III) to form a violet complex that is determined photometrically.
The method is analogous to EPA 340.3 and APHA 4500-F^- E.

2. Measuring range and number of determinations

Cell mm	Measuring range mg/l F^-	Number of determinations
10	**0.10** - 2.00 1.0 - **20.0**	100 (Cat. No. 1.14598.0001) or 250 (Cat. No. 1.14598.0002)

For programming data for selected photometers / spectrophotometers see www.service-test-kits.com.

3. Applications

This test does not measure any complex fluorine compounds as occur in some cases in galvanic waste water.

Sample material:
Groundwater and surface water, sea water
Drinking water and mineral water
Wastewater and percolating water

4. Influence of foreign substances

This was checked in solutions containing 1 (10) and 0 mg/l F^-. The determination is not yet interfered with up to the concentrations of foreign substances given in the table. The values in parentheses apply for the measuring range 1.0 - 20.0 mg/l F^-.

Concentrations of foreign substances in mg/l or %					
Ag^+	**1 (10)**	**Mn^{2+}**	**2** (20)	**EDTA**	**0.1 (1)**
Al^{3+}	**1 (5)**	NH_4^+	1000 (1000)	**Free chlorine**	**10** (50)
Ca^{2+}	50 (500)	**Ni^{2+}**	**1 (10)**	Anionic surfactants[1]	1000 (1000)
Cd^{2+}	**5** (50)	NO_2^-	1000 (1000)	Cationic surfactants[2]	50 (500)
CN^-	**0.5 (5)**	**Pb^{2+}**	**1 (10)**	Nonionic surfactants[3]	1000 (1000)
CO_3^{2-}	1000 (1000)	**PO_4^{3-}**	**2** (20)	Na-acetate	10 % (20 %)
Cr^{3+}	**5** (50)	S^{2-}	100 (1000)	NaCl	10 % (20 %)
$Cr_2O_7^{2-}$	1000 (1000)	SiO_3^{2-}	1000 (1000)	$NaNO_3$	10 % (20 %)
Cu^{2+}	**2** (25)	**Zn^{2+}**	**2** (25)	Na_2SO_4	10 % (20 %)
Fe^{3+}	**2** (20)				
Hg^{2+}	**2** (20)				
Mg^{2+}	100 (1000)				

[1] tested with Na-dodecyl sulfate
[2] tested with N-cetyl-N,N,N-trimethylammonium bromide
[3] tested with Triton® X-100

5. Reagents and auxiliaries

Please note the warnings on the packaging materials!

The test reagents are stable up to the date stated on the pack when stored closed at +15 to +25 °C.

Package contents:
Reagent F-1: 1 bottle
Reagent F-2: 1 bottle (Cat. No. 1.14598.0001) or
2 bottles (Cat. No. 1.14598.0002)
2 AutoSelectors

Other reagents and accessories:
MColorpHast™ Universal indicator strips pH 0 - 14, Cat. No. 109535
Sodium hydroxide solution 1 mol/l TitriPUR®, Cat. No. 109137
Sulfuric acid 0.5 mol/l TitriPUR®, Cat. No. 109072
Water for analysis EMSURE®, Cat. No. 116754
Fluoride standard solution CertiPUR®, 1000 mg/l F^-, Cat. No. 119814

Pipettes for pipetting volumes of 0.50 and 5.0 ml
Pipette for a pipetting volume of 2.0 ml - suited for pipetting volatile organic solvents
Rectangular cells 10 mm (2 pcs), Cat. No. 114946

6. Preparation

- **The pH must be within the range 3 - 8.**
  Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.

7. Procedure

7.1 Measuring range 0.10 - 2.00 mg/l F^-

Reagent F-1	2.0 ml	Pipette into a test tube.
Pretreated sample (**10 - 40 °C**)	5.0 ml	Add with pipette and mix.
Reagent F-2	1 level blue microspoon (in the cap of the F-2 bottle)	Add and shake **vigorously until the reagent is completely dissolved**.
Leave to stand for 5 min (reaction time), then fill the sample into a 10-mm cell, and measure in the photometer.		

7.2 Measuring range 1.0 - 20.0 mg/l F^-

Reagent F-1	2.0 ml	Pipette into a test tube.
Distilled water[1] (**10 - 40 °C**)	5.0 ml	Add with pipette and mix.
Pretreated sample (**10 - 40 °C**)	0.50 ml	Add with pipette and mix.
Reagent F-2	1 level blue microspoon (in the cap of the F-2 bottle)	Add and shake **vigorously until the reagent is completely dissolved**.
Leave to stand for 5 min (reaction time), then fill the sample into a 10-mm cell, and measure in the photometer.		

[1] It is recommended to use water for analysis EMSURE®, Cat. No. 116754.

Notes on the measurement:

- **Reclose the reagent bottles immediately after use.**
- **Certain photometers may require a blank** (preparation as per measurement sample, but with distilled water instead of sample).
- For photometric measurement the cells must be clean.
  Wipe, if necessary, with a clean dry cloth.
- Measurement of turbid solutions yields false-high readings.
- The pH of the measurement solution must be within the range 4.4 - 4.7.
- The color of the measurement solution remains stable for 60 min after the end of the reaction time stated above.
- In the event of fluoride concentrations exceeding 5 mg/l (for the procedure described in section 7.1) or exceeding 50 mg/l (for the procedure described in section 7.2), other reaction products are formed and false-low readings are yielded. In such cases it is advisable to conduct a plausibility check of the measurement results by diluting the sample (1:2, 1:10).

8. Analytical quality assurance

recommended before each measurement series
To check the photometric measurement system (test reagents, measurement device, handling) and the mode of working, a dilute fluoride standard solution containing 1.00 or 10.0 mg/l F^- can be used.
Sample-dependent interferences (matrix effects) can be determined by means of standard addition.
Additional notes see under **www.qa-test-kits.com**.

Characteristic quality data:

In the production control, the following data were determined in accordance with ISO 8466-1 and DIN 38402 A51:

	Measuring range mg/l F^-	
	0.10 - 2.00	**1.0 - 20.0**
Standard deviation of the method (mg/l F^-)	± 0.015	± 0.15
Coefficient of variation of the method (%)	± 1.4	± 1.4
Confidence interval (mg/l F^-)	± 0.04	± 0.4
Number of lots	30	30

Characteristic data of the procedure:

	Measuring range mg/l F^-	
	0.10 - 2.00	**1.0 - 20.0**
Sensitivity: Absorbance 0.010 A corresponds to (mg/l F^-)	0.02	0.2
Accuracy of a measurement value (mg/l F^-)	max. ± 0.12	max. ± 1.2

For quality and batch certificates for Spectroquant® test kits see the website.

9. Note

Information on disposal can be obtained at www.disposal-test-kits.com.

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www.analytical-test-kits.com

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