Technical Specification

Tests For: Total aluminium in natural and treated waters

Test Range: 0–0.5 mg/L

Reagent Chemistry Used: Ericochrome cyanine R

Basis of Test Method: Standard Method 3500-B, ISO15923-2:2017

Method Detection Limit*: 0.01 mg/L

Limit of Quantification**: 0.04 mg/L

*The Method Detection Limit (MDL) is defined as the minimum measured concentration of a substance that can be reported with 99% confidence to be different from the method blank results.[i]

**The Limit of Quantification (LOQ) is the smallest quantity that can be detected with reasonable certainty for a given analytical procedure. [ii]

Testing for Aluminium

Aluminium sulphate is widely used as a coagulant in drinking water treatment. The determination of aluminium (residual alum) is usually required for the control of alum coagulation and filtration processes at water works.

Aluminium salts are found in natural waters; levels are reported to be increasing particularly in areas affected by acid rain. High aluminium levels can be toxic to fish and aquatic life. Aluminium determination is necessary therefore for environmental control and for testing water used for fish farms, etc.

The Palintest Aluminium test provides a simple method of measuring aluminium levels in natural and drinking waters over the range 0 - 0.5 mg/l.

Reagent Chemistry

Aluminium reacts with Eriochrome Cyanine R indicator in slightly acid solution to produce a pink-red coloured complex. In the Palintest Aluminium method the necessary reagents are incorporated into two test tablets. The test is simply carried out by adding one of each tablet to a sample of the water. The first tablet acidifies the sample to bring any colloidal aluminium into solution and the second tablet buffers the solution to provide the correct conditions for the test.

The intensity of the colour produced in the test is proportional to the aluminium concentration and is measured using a Palintest Photometer.

Interferences

The presence of ascorbic acid eliminates interference from iron and manganese.

The presence of polyphosphate or fluoride can lead to low aluminium readings. Polyphosphate is unlikely to be present in significant quantities in normal water samples. Fluoride will only be significant for control samples from water works where fluoridation is practised. In such cases samples should preferably be taken before the final fluoridation stage.

For samples taken after fluoridation such as those from water distribution systems, or for samples containing natural fluoride, the aluminium concentration should be corrected. To obtain the corrected aluminium concentration use the following formula:

Corrected Value = Photometer Reading x (1 + (0.4 x Fluoride Concentration))

A separate test is available for measuring fluoride.

Best Practice Advice for Testing

- Aluminium is readily absorbed on to the surfaces of sample containers, particularly glass containers. To avoid loss of aluminium, collect samples in plastic bottles and test as soon as possible after collection. Sample bottles should be acid-rinsed and thoroughly washed out with deionised water before re-use.

- Ensure both reagents are crushed thoroughly, specifically the No 2 reagent.

- After crushing, check the solution for the presence of any bubbles. Tilt the tube on the side and rotate to remove bubbles.

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[i] EPA, Definition and Procedure for the Determination of the Method Detection Limit, Revision 2, Dec 2016.
[ii] *IUPAC. Compendium of Chemical Terminology, 2nd ed. (the "Gold Book").*

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Test Method Technical Information: Aluminium