Technical Specification

Tests For: Iron (total) in natural, treated, and industrial waters
Test Range: 0–5.0 mg/L
Reagent Chemistry Used: Phenanthroline (PPST)
Basis of Test Method: Standard Method 3500-Iron-B
Method Detection Limit*: 0.02 mg/L
Limit of Quantification**: 0.07 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 Iron

Iron occurs widely in nature and is found in many natural and treated waters. Iron is an objectionable constituent in both domestic and industrial water supplies. The presence of iron affects the taste of beverages and causes unsightly staining of laundered clothes, plumbing fittings, swimming pool surfaces and the like. The formation of insoluble iron deposits is troublesome in many industrial applications and in the agricultural water uses such as drip feed irrigation. In industry iron salts occur through corrosion of plant and equipment, and from industrial processes.

Iron is therefore an important test for the monitoring of natural and drinking waters, for corrosion control in industry and for the checking of effluents and waste waters. The Palintest Iron MR test provides a simple test for the determination of both ferrous and ferric iron. It can dissolve colloidal and particulate iron and thus gives a measure of the total iron content of the water.

Reagent Chemistry

In the Palintest Iron MR method iron is reduced to the ferrous form and then reacted with 1,10-phenanthroline to form an orange-coloured complex. A decomplexing agent is incorporated into the reagent system to break down complexed forms of iron. The test is simply carried out by adding tablet reagents to a sample of the water under test.

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

Interferences

Hardness 500 mg/l $CaCO_3$, Silica 150 mg/l SiO_2 and Copper 3 mg/l Cu do not interfere with the test. Chromium 10 mg/l may cause slightly high results.

Nitrite greater than 50 mg/l NO_2 causes low results and molybdate at any concentration causes precipitation. A pre-treatment procedure using Citrate IR tablets can be used to remove interference from nitrite up to 500 mg/l NO_2 and molybdate up to 20 mg/l MoO_4. This pre-treatment does however reduce the tolerance to chromium and is therefore not recommended for chromium containing samples.

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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").*