

Technical Specification

Tests For: Hardness in Natural and Treated Waters

Test Range: 0–300 mg/L

Reagent Chemistry Used: Orthocresolphthalein

Method Detection Limit*: 7.3 mg/L

Limit of Quantification**: 23.3 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 Total Hardness

Water hardness is caused by the presence of calcium and magnesium salts. High levels of hardness prevent the formation of lather with soap and can cause scaling in water systems - particularly boilers, heat exchangers and steam generating plant. Hardness is an important control test in a wide variety of applications.

The Palintest Hardness test provides a simple method of checking water hardness over the range 0–300 mg/L CaCO₃.

Reagent Chemistry

The Palintest Total Hardness test is based on a unique colorimetric method. The reagents are provided in tablet form and the test is carried out simply by adding the appropriate tablets to a sample of the water.

Under the controlled conditions of the test calcium and magnesium ions react with an indicator to produce a purple coloration. The intensity of the colour is proportional to the total hardness of the water and is measured using a Palintest Photometer.

Interferences

Unusually high levels of iron (above 10 mg/L) will cause low results for total hardness.

The pH required in the test is closely controlled by a buffer mixture included in the tablet formulation. However, to avoid exceeding the buffer capacity strongly acid or alkaline samples should be adjusted to within the pH range 4 to 10, prior to the start of the test.

Best Practice Advice for Testing

- The expression of hardness results sometimes causes confusion. It is normal practice to express the result of hardness tests as mg/L CaCO₃ (calcium carbonate). This is merely a convention to allow the comparison of different results and does not necessarily indicate that the hardness is present in the water in this form.

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")*.