

CALCIUM HARDNESS

Tablet Count Method

**TEST FOR CALCIUM HARDNESS
IN NATURAL AND TREATED WATER**

0 – 500 mg/l CaCO₃

Calcium hardness is caused by the presence of calcium ions in the water. Calcium salts can be readily precipitated from water and high levels of calcium hardness tend to promote scale formation in water systems. Calcium hardness is an important control test in industrial water systems such as boilers and steam raising plant, and for swimming pool waters.

The Palintest Calcium Hardness test provides a simple method of determining calcium hardness over the range 0 - 500 mg/l CaCO₃.

Method

Calcium salts are complexed by the reaction with ethylenediaminetetraacetic acid (EDTA). Excess calcium ions react with a specific indicator to form a distinctive coloration. The test is carried out in alkaline solution in order to precipitate magnesium salts which would otherwise interfere with the test. The Palintest Calcium Hardness test uses a tablet reagent containing a standardised amount of EDTA in alkaline formulation with murexide as indicator. The test is carried out by adding tablets one at a time to a sample of water until the colour changes from pink to violet. The result is calculated from the number of tablets used in relation to the volume of water taken.

Reagents and Equipment

Palintest Calcium Hardness Tablets

Palintest Sample Container, 50/10 ml plastic (PT 506, PT 519) or

Palintest Sample Containers, 100/50/10 ml plastic (PT 510) or

Palintest Sample Containers, 200/100/50 ml glass (PT 505)

Test Range

The test is normally carried out on a 50 ml sample although a larger sample may be used if a lower test range is required. The table below indicates the sample size appropriate to various calcium hardness test ranges :-

| <i>Test Range</i> | <i>Sample Size</i> |
|-------------------|--------------------|
| 0 – 100 mg/l | 200 ml |
| 0 – 250 mg/l | 100 ml |
| 0 – 500 mg/l | 50 ml |

Test Procedure

- 1 Select the sample size appropriate to the calcium hardness range under test. Take a sample of the correct size in the sample container.
- 2 Add one Calcium Hardness tablet and shake the container until the tablet disintegrates.
- 3 Continue adding tablets one at a time in this manner until the colour of the solution changes from pink to violet.
- 4 Note the number of tablets used and calculate the result from the formula below appropriate to the sample volume taken :-

| Sample Size | Calculation - Calcium Hardness (mg/l CaCO ₃) |
|-------------|--|
| 200 ml | = (No of Tablets x 10) - 5 |
| 100 ml | = (No of Tablets x 20) - 10 |
| 50 ml | = (No of Tablets x 40) - 20 |

Magnesium Hardness

Magnesium hardness is caused by the presence of magnesium salts in the water. The total hardness of the water is the sum of the calcium hardness and magnesium hardness. Total hardness of the water may be determined using the Palintest Hardness method (see test instruction sheet H1). If required the magnesium hardness can therefore be obtained by the difference between total hardness and calcium hardness test results :-

$$\text{Magnesium Hardness (as CaCO}_3\text{)} = \text{Total Hardness} - \text{Calcium Hardness}$$

Note

The expression of hardness results sometimes causes confusion. It is normal practice to express the results of hardness tests as mg/l CaCO₃ (calcium carbonate), irrespective of whether total, calcium or magnesium hardness is being measured. 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.