Test Procedures

Determination of Total Hardness

Tablet Test	Measurement Range	Order Code
Total Hardness Test Kit	5 to 500mg/l	755775
Total Hardness Tablets (250)		755779

Introduction
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 steam boilers, engine cooling systems and fresh water pipework. Hardness is an important control test in a wide variety of applications.
The Total Hardness Test provides a simple method of checking water hardness over the range 5 - 500 mg/l $CaCO_3$.

Method
Calcium and magnesium ions are complexed by reaction with ethylenediaminetetraacetic acid (EDTA). Excess calcium and magnesium ions react with a specific indicator to produce a distinctive coloration. The Hardness test uses a tablet reagent containing a standardized amount of EDTA with eriochrome black as indicator. The test is carried out by adding tablets one at a time to a sample of water until the colour changes from plum red to blue. The Total Hardness result is calculated from the number of tablets used in relation to the volume of water sample taken.

Test Range
The test is normally carried out on a 50ml 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.

Test Range	Sample Size
0 - 100 mg/l CaCO3	200 ml
0 - 250 mg/l CaCO3	100 ml
0 - 500 mg/l CaCO3	50 ml

For 200 ml samples uses the container provided to measure 2 x 100 ml samples into a suitable clear container which is thoroughly clean.

Test Method

1) Select the sample size appropriate to the hardness range under test. Take a sample of the correct size in the sample container.
2) Add one Total 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 plum red to blue.
4) Note the number of tablets used and calculate the result from the formula below appropriate to the sample volume taken.

Total Hardness Calculation

Sample Size	**Total 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

Cleaning
Thoroughly rinse out sample container after use.

Note
1. This test measures total hardness, i.e. the total content of calcium and magnesium ions in the water.
2. The expression of hardness results is normally expressed as mg/l $CaCO_3$ (calcium carbonate). This is a convention to allow the comparison of different results and does not necessarily indicate that the hardness is present in the water in only the calcium form.

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