

TOTAL ALKALINITY

Tablet Count Method

TEST FOR TOTAL ALKALINITY IN NATURAL AND TREATED WATERS

0 – 500 mg/l CaCO₃

Natural and treated waters may contain a variety of dissolved alkaline substances such as carbonates, bicarbonates, hydroxides and, to a lesser extent, borates, phosphates and silicates. In most waters at normal pH levels the alkalinity results mainly from the presence of bicarbonates. The Total Alkalinity test provides a measure of the total quantity of alkaline substances dissolved in the water.

The total alkalinity is an important test in determining the aggressiveness or the scale forming tendency of the water. If the total alkalinity is low the water may be aggressive and cause corrosion to pipe work and structures; if the total alkalinity is high the water may more readily promote scale formation. Alkalinity control is therefore an important part of many water treatment programmes.

The Palintest Total Alkalinity Test covers the range 0 - 500 mg/l CaCO₃. The test is particularly suitable for checking natural and drinking waters, swimming pool waters, effluents, etc.

Method

Alkalinity is the capacity of a water to react with acid to a specified pH, 4.5 - 5.0 in the case of the total alkalinity test. The Palintest Total Alkalinity test uses a tablet reagent containing a standardised amount of acid together with a pH indicator which is designed to change colour within this pH range. The test is carried out by adding tablets one at a time to a sample of water until the colour changes from yellow to bright red. The result is calculated from the number of tablets used in relation to the volume of water sample taken.

Reagents and Equipment

Palintest Total Alkalinity Tablets

Palintest Sample Container (PT 506, PT 510 or PT 519)

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 different alkalinity test ranges :-

Test Range	Sample Size
0 - 250 mg/l CaCO ₃	100 ml
0 - 500 mg/l CaCO ₃	50 ml

Test Procedure

- 1 Select the sample size appropriate to the total alkalinity range under test. Take a sample of the correct size in the Palintest sample container.
- 2 Add one Total Alkalinity 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 yellow to deep pink. (Ignore any intermediate orange-pink coloration).
- 4 Note the number of tablets used and calculate the result from the formula below appropriate to the sample volume taken :-

Sample Size	Calculation - Total Alkalinity (mg/l CaCO ₃)
100 ml	= (Number of Tablets x 20) - 10
50 ml	= (Number of Tablets x 40) - 20

Relationship between Alkalinity and Hardness

Certain calcium and magnesium salts contribute to both the alkalinity and the hardness of the water. The relationship between the total alkalinity and the total hardness of the water can be used to determine whether the water hardness is temporary or permanent. Temporary hardness is the hardness which can be removed by boiling the water, permanent hardness is the hardness which remains even when the water has been boiled :-

If the Total Hardness is greater than the Total Alkalinity then :-

Temporary Hardness = Total Alkalinity

Permanent Hardness = Total Hardness - Total Alkalinity

If the Total Hardness is less than the Total Alkalinity then :-

Temporary Hardness = Total Hardness

ie all of the hardness is temporary

Notes

- 1 The expression of alkalinity results can sometimes cause confusion. It is normal practice to express the results of alkalinity tests as mg/l CaCO₃ (calcium carbonate). This is merely a convention to allow for the comparison of different results and does not necessarily indicate that the alkalinity is present in the water in this form.
- 2 For a full evaluation of the aggressiveness or scale-forming tendency of water, see the Palintest Balanced Water Test. The Palintest Balanced Water Index is a calculated function which takes into account the total alkalinity, calcium hardness, pH and temperature of the water.