



TECHNICAL DATASHEET

pH & Alkalinity

pH is a numeric scale used to specify the Acidity or Alkalinity of a liquid. The pH scale is based on a molar concentration per litre of water. Pure water is pH Neutral (pH7) with extremes being Battery Acid (pH0) and Caustic Soda (pH14).

0	Battery Acid
1	Stomach Acid (Hydrochloric)
2	Lemon Juice, Vinegar
3	Grapefruit and Orange Juice Apples
4	Tomato Juice, Beer Acid Rain
5	Black Coffee Healthy Skin, Hair and Nails
6	Urine, Saliva, Milk
7	Water, Blood
8	Shampoos (7.0 to 10.0) Baking Soda, Seawater, Eggs Perm Solutions (8.5 to 9.5)
9	Toothpaste, Hand Soap
10	Milk of Magnesia, Mild Detergent
11	Household Ammonia and Cleaners Soapy Water
12	Hair Straighteners (11.5 to 14:0)
13	Bleach, Oven Cleaner
14	Liquid Drain Cleaner, Caustic Soda



Background

Alkalinity can be defined as the ability of a water to neutralize acid. The alkalinity of natural or treated waters is usually due to the presence of bicarbonate, carbonate and hydroxide compounds of calcium, magnesium, sodium and potassium. In natural waters, the alkalinity is mostly due to calcium bicarbonate.

During waste water treatment, the nitrification process is used to convert ammonia, one of the primary pollutants, into nitrate. Nitrification is achieved through utilizing nitrogen-converting bacteria that are most active in the pH range 7 to 8. During nitrification, hydrogen ions are released leading to the consumption of alkalinity and resulting in the need to add an alkali to the treatment system to maintain optimum conditions and achieve the most effective treatment.

Analysis

The total alkalinity is determined by titration of the sample with a strong acid and instrumental detection of end point at pH 4.5. Alkalinity to pH 8.3 can also be determined. Results are reported in mg/l expressed as calcium carbonate (CaCO₃).

There is no preservative required for alkalinity analysis. Samples should be analysed as soon as possible after receipt. Samples should be allowed to reach room temperature prior to analysis.

Samples are stable for 28 days (In-House Data) from sampling.

The instrumental titration method is free from interference, from strongly coloured or turbid samples, which affect the visual detection of the titration end point using the colorimetric method. Difficulties in instrumental end point detection may be experienced in the presence of organic substances.

The pH of a solution is equal to $\text{Log}_{10} 1/[\text{H}^+]$ and is measured directly by a pH probe which has been previously calibrated using solutions of a known pH.

Above a pH of 12 the electrode response may not be linear for pH values. Also, if high sodium concentrations are present, the response for pH may not be perfectly linear above pH 10.

References:

The Determination of Alkalinity and Acidity in Water. 1981. Methods for the Examination of Waters and Associated Materials. HMSO. ISBN 0117516015.