

METHOD STATEMENT



Determinand:

Manual determination of pH

Matrix:

Sample Types: Raw and Potable waters.

Principle of Method:

This method uses a Jenway model 3510 pH meter and a suitable pH electrode.

The pH of a solution is defined as the negative logarithm to the base 10 of the hydrogen ion concentration. pH is measured in moles per litre, although by convention results are quoted without units.

The pH of a solution is determined by measuring a series of electromotive forces (EMF) created in and around the pH electrode. The electromotive forces create a potential difference between two electrodes and this difference is measured by a high impedance voltmeter (the pH meter). In acid solution the H⁺ ions permeate the glass membrane of the electrode causing a positive potential on the indicator electrode. In alkaline solution H⁺ ions leave the electrode and leave an excess of OH⁻ ions within the electrode causing a negative potential on the indicator electrode. It is this potential difference between the indicator electrode and reference electrode that is measured by the pH meter and converted to a pH result. A more extreme pH result is given when the potential difference is greater because of a greater exchange of H⁺ ions.

Sampling and Sample Preparation:

Samples are normally collected in 500 ml PET bottles. Other size PET bottles are also suitable.

No special preservation is required.

If analysis cannot be immediately undertaken, samples should be stored at a temperature of 3±2°C until the day of analysis. Samples should be allowed to equilibrate to room temperature prior to analysis and analysed within 2 days after sampling. Room temperature is considered to be 17 - 23°C.

Interferences

Loss of linearity may occur at extreme high pH's (>10.0) or low pH's (<2.0). These extremes are unlikely to be found in Potable waters.

If oil or grease is present in the sample the electrode may become coated, this could cause measurement errors.

Temperature significantly effects pH measurement. Although the instrument compensates for temperature by automatic adjustment, all samples and standards should be analysed at room temperature.

Performance of Method:

Range of Application:

A calibration range of 4.0 to 10.0 is obtained using three calibration standards. The calibration range is extended by using a pH 12.0 buffer when necessary.

There is no reporting limits associated with pH and a summary of the performance testing details are documented in the table below.

pH METER 1 (Asset No 3218)

Sample type	Mean sample result	Precision (St)
Potable. Wakefield (medium)	7.37	0.065

pH METER 2 (Asset No 1120)

Sample type	Mean sample result	Precision (St)
Potable. Bridgend (soft)	7.67	0.048
Potable. Wakefield (medium)	7.61	0.045
Potable. Coventry (hard)	7.66	0.041
Raw. Derwent at Elvington	8.32	0.021

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pH METER 3 (Asset No 3217)

Sample type	Mean sample result	Precision (St)
Potable. Wakefield (medium)	7.255	0.071

pH METER 4 (Asset No 3035)

Sample type	Mean sample result	Precision (St)
Potable. Elvington (hard)	7.41	0.033

pH METER 5 (Asset No 2462)

Sample type	Mean sample result	Precision (St)
Potable. Wakefield (medium)	7.49	0.106

Limit of Quantification:

Not applicable to this test

Uncertainty of measurement:

The Uncertainty of Measurement values are available on request.

References:

Determination of pH in Low Ionic Strength Waters 1988. Methods for the Examination of Waters and Associated materials.(HMSO). ISBN 0117520845

Jenway pH meter model 3510 instruction manual

Electrolyte Solutions (Second Revised Edition 2002) - R. A. Robinson and R. H. Stokes. ISBN 0-486-42225-9

- This publication is the reference for the preparation of the AQC buffer.