



## Alkalinity of Water

### Introduction

Alkalinity of water is determined by end point titration with a strong acid solution. "Phenolphthalein" alkalinity corresponds to titratable alkalinity at pH 8.3 and total alkalinity corresponds to titratable alkalinity at pH 4.5. This application note is an application of international standard ISO 9963-1

### Principle

The current standard uses HCl 0.1 eq/l as titrant but another strong acid such as H<sub>2</sub>SO<sub>4</sub> 0.1 eq/l can also be used. If the pH of the water sample is below 8.3, the "Phenolphthalein" alkalinity is, by definition, equal to zero.

Results are normally expressed as mmoles/l (or meq/l) of "alkalinity", but other units can be used (see notes).

If a suitable sensor is used, the alkalinity determination can be linked with a pH and temperature measurement of the sample.

### Electrode and reagents

pHC3081-8 Combined pH Electrode with temperature sensor (part no. E16M305)

HCl 0.1 eq/l solution in distilled water

Distilled water

IUPAC Series pH standards

pH 4.005 (part no. S11M002) or pH 7.000 (part no. S11M004) and pH 10.012 (part no. S11M007)

### End Point titration settings

**2 linked methods, one for pH measurement and the second for alkalinity measurement**

#### pH measurement

Temperature:	Probe
Stability:	25 mpH/min
Acceptation time:	45 seconds
Max stabilisation time:	2 min

#### TCA and TA determination

Burette volume:	10 ml
Stirring speed:	400 rpm
Working mode:	pH
Number of end points:	2
TCA end point:	8.30 pH
Proportional band:	0.5 pH
TA end point:	4.50 pH

Proportional band:	1.0 pH
Stirring delay:	30 seconds
Minimum speed:	0.2 ml/min
Maximum speed:	4 ml/min
End point delay:	10 seconds
Sample unit:	ml
Sample amount:	100
Titration:	Decreasing pH
Results:	meq/l
Results:	cumulate

### Procedure

This standard can be used with natural, drinking and wastewaters with TA between 0.4 and 20 mmoles/l.

Calibrate the electrode with pH 4.005 and pH 10.012 IUPAC Series pH standards.

Pipette 100 ml of water.

Dip electrode and delivery tip in the sample.

Start method by pressing the RUN key.

### Results

**Expressed as milliequivalents/l (or millimol/l) of OH- alkalinity**

$$R = V(\text{titr}) * C(\text{titr}) * 1000 / V(\text{smp})$$

-V(titr) = Total volume of titrant in ml, delivered to reach the end point (pH 8.3 or pH 4.5)

-C(titr) = titrant concentration in eq/l (currently 0.1)

-V(smp) = Volume of the sample (currently 100 ml)

#### For a result in mmol/l

Enter

The sample amount in the SAMPLE screen

The titrant concentration in the TITRANT screen

1 Titrant and 1 Sample in the COEFFICIENTS display

The Titration Manager gives a result according to the above formula.

#### Results for 5 determinations in milliequivalents/l

Mean	3.6
Standard deviation:	0.038
Relative standard deviation:	1%

