# Alkalinity (P, M, OH) 56I700131

## 50 - 2400 mg/L $CaCO_3$

## Material

| Reagents | Packaging Unit | Part Number |
|---|---|---|
| Alkalinity 4.5 Indicator TA4 | 65 mL | 56L013865 |
| Alkalinity LR Titrant TA3 | 65 mL | 56L013965 |
| Alkalinity HR Titrant PA2/TA2 | 65 mL | 56L013665 |
| Alkalinity OH Reagent PA3 | 65 mL | 56L013765 |
| Alkalinity P Indicator, 65 mL | 65 mL | 56L070365 |

The following accessories are required.

| Accessories | Packaging Unit | Part Number |
|---|---|---|
| Syringe, plastic, 20 mL | 1 pc. | 56A006501 |
| Titration jar with cap, plastic, 60 mL | 1 pc. | 56A006701 |

## Application List

- Cooling Water
- Boiler Water
- Others

## Preparation

**Alkalinity Relationships:**

The separate contributions to alkalinity from free caustic, carbonate and bicarbonate can be estimated using the P & M alkalinity relationship in the table below.

| If | OH | $CO_3$ | $HCO_3$ |
|---|---|---|---|
| P = 0 | 0 | 0 | M |
| P < M/2 | 0 | 2P | M-2P |
| P = M/2 | 0 | 2P | 0 |
| P > M/2 | 2P-M | 2(M-P) | 0 |
| P = M | M | 0 | 0 |

## Notes

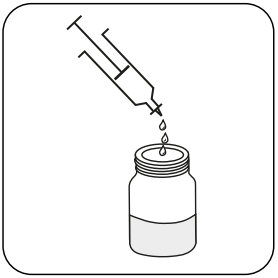
1. Alkalinity P: The P refers to phenolphthalein the indicator originally used for titrating P Alkalinity. The colour change occurs at pH 8.3. Less hazardous alternatives are now used.
2. Alkalinity M: The M refers to methyl orange, the indicator originally used for titrating Total Alkalinity. Nowadays 4.5 indicator is used but old M terminology has remained.
3. Alkalinity OH: Barium chloride precipitates with carbonate ions to produce a white precipitate in the test. The remaining alkalinity present in the same sample attributed to the presence of hydroxide ions (OH).

## Sampling

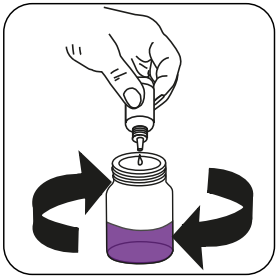
Select the sample volume from the table according to the expected measuring range and read off the factor to calculate the result.

| Expected Range | Titrant used | Sample Size | Factor |
|---|---|---|---|
| 50-150 mg/L | Alkalinity LR Titrant TA3 | 40 mL | 5 |
| 100-300 mg/L | Alkalinity LR Titrant TA3 | 20 mL | 10 |
| 200-600 mg/L | Alkalinity LR Titrant TA3 | 10 mL | 20 |
| 200-600 mg/L | Alkalinity HR Titrant PA2/TA2 | 40 mL | 20 |
| 400-1200 mg/L | Alkalinity HR Titrant PA2/TA2 | 20 mL | 40 |
| 800-2400 mg/L | Alkalinity HR Titrant PA2/TA2 | 10 mL | 80 |

## Determination of Alkalinity-P

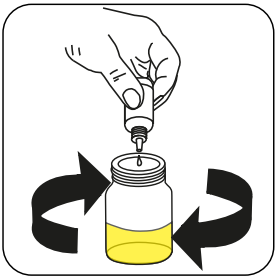


**Attention!** Select the appropriate sample volume according to the instructions in the chapter Sampling.



Add drops of **Alkalinity P Indicator** to give a **purple** colour.

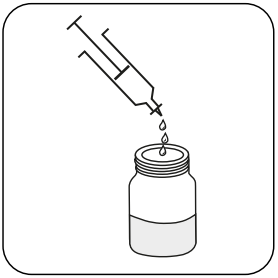
**Attention!** Record the number of drops that will be added.
**Note:** Make sure to swirl the jar after adding each drop!



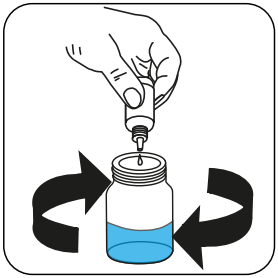
Add **Alkalinity LR Titrant TA3 or Alkalinity HR Titrant PA2/TA2** drop by drop to the sample until colouration turns from **purple** to **pale yellow**.

**Calculate test result: P Alkalinity (as $CaCO_3$) mg/L = Number of drops x factor (see table)**

## Determination of Alkalinity-M



**Attention!** Select the appropriate sample volume according to the instructions in the chapter Sampling.



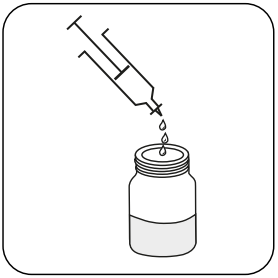
Add drops of **Alkalinity 4.5 Indicator TA4** to give a **pure blue** colour.

**Attention!** Record the number of drops that will be added.
**Note:** Make sure to swirl the jar after adding each drop!

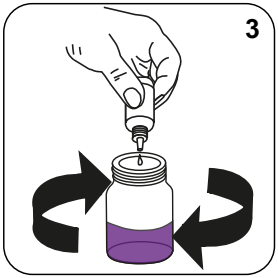
Add **Alkalinity LR Titrant TA3 or Alkalinity HR Titrant PA2/TA2** drop by drop to the sample until colouration turns from **blue** to **orange/yellow** .

**Calculate test result: Total Alkalinity (as $CaCO_3$) mg/L = Number of drops x factor (see table)**

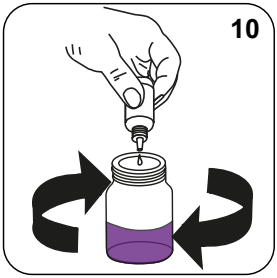
## Determination of Alkalinity-OH



**Attention!** Select the appropriate sample volume according to the instructions in the chapter Sampling.




Add **3** drops of **Alkalinity P Indicator** to give a **purple** colour.




Add **10 drops Alkalinity OH Reagent**. Note: If sample remains colourless, report the P Alkalinity as zero.

**Attention!** Record the number of drops that will be added.
**Note:** Make sure to swirl the jar after adding each drop!

Add **Alkalinity LR Titrant TA3 or Alkalinity HR Titrant PA2/TA2** drop by drop to the sample until colouration turns from **purple** to **yellow**.

**Calculate test result: OH Alkalinity (as $CaCO_3$) mg/L = Number of drops x factor (see table)**