HYDROXIDE, PHENOLPHTHALEIN & TOTAL ALKALINITY

DROP COUNT METHOD

MODEL MPH-DC • CODE 7515

QUANTITY	CONTENTS	CODE
100	Phenolphthalein Tablets	T-2246-J
100	BCG-MR Indicator Tablets	T-2311-J
30 mL	*Barium Chloride Solution, 10%	*6117-G
2 x 60 mL	*Alkalinity Titration Reagent	*6102PS-H
1	Test Tube, 5-10-15 mL, glass, w/cap	0778
1	Pipet, plain, plastic	0352
1	Acid Demand Index	1546

***WARNING:** Reagents marked with an * are considered hazardous substances. To view or print a Material Safety Data Sheet (MSDS) for these reagents see MSDS CD or our web site. To obtain a printed copy, contact us by e-mail, phone or fax.

To order individual reagents or test kit components, use the specified code number.

HYDROXIDE ALKALINITY

1. Fill test tube (0778) to 5 mL line with sample water.
2. Add 10 drops of *Barium Chloride Solution, 10% (6117). A white precipitate will form if carbonates are present.
3. Add one Phenolphthalein Tablet (T-2246). Cap and mix until tablet disintegrates. If solution does not turn red, the Hydroxide Alkalinity is zero. If solution turns red, proceed to Step 4.
4. Fill the pipet (0352) with *Alkalinity Titration Reagent (6102PS). Hold pipet vertically. While gently swirling tube, add *Alkalinity Titration Reagent, one drop at a time, until color changes from red to colorless. Count the number of drops added.
5. Multiply number of drops added in Step 4 by 10. Record as ppm Hydroxide Alkalinity as $CaCO_3$.

Number of Drops of Titration Reagent x 10 = ppm Hydroxide Alkalinity expressed as ppm Calcium Carbonate ($CaCO_3$)

PHENOLPHTHALEIN (P) ALKALINITY

1. Fill test tube (0778) to 5 mL line with sample water.
2. Add one Phenolphthalein Tablet (T-2246). Cap and mix until tablet disintegrates. If solution turns red proceed to Step 3. If solution does not turn red, P Alkalinity is zero.
3. Fill pipet (0352) with *Alkalinity Titration Reagent (6102PS). Hold pipet vertically. While gently swirling tube, add *Alkalinity Titration Reagent, one drop at a time, until color changes from red to colorless. Count the number of drops added.
4. Multiply the number of drops added in Step 3 by 10. Record as ppm P Alkalinity as $CaCO_3$.

   Number of Drops of Titration Reagent x 10 = ppm Phenolphthalein Alkalinity expressed as ppm Calcium Carbonate ($CaCO_3$)

5. Save sample for T Alkalinity test.

TOTAL (T) ALKALINITY

1. Use the sample from the P Alkalinity test, or fill the test tube (0778) to the 5 mL line with sample water.
2. Add one BCG-MR Indicator Tablet (T-2311). Cap and mix until tablet disintegrates.
3. Fill the pipet with *Alkalinity Titration Reagent (6102PS). Hold pipet vertically. While gently swirling tube, add *Alkalinity Titration Reagent, one drop at a time, until color changes from green to pink. Count the number of drops added.
4. Multiply number of drops used in Step 3 by 10. Record as ppm T Alkalinity as $CaCO_3$.

   NOTE: If the same sample is used for both the P and T Alkalinity tests, add both test results to calculate T Alkalinity.

   Number of Drops of Titration Reagent x 10 = Total Alkalinity expressed as ppm Calcium Carbonate ($CaCO_3$)

When testing swimming pool water, consult the Acid Demand Index (1546) to determine if the Total Alkalinity value is excessive. The Index will indicate the recommended quantity of acid required to offset high alkalinity content.

CALCULATION OF ALKALINITY RELATIONSHIPS

The results obtained from the Phenolphthalein and Total Alkalinity determinations offer a means for the stoichiometric classification of the three principal forms of alkalinity present in many water supplies. The classification attributes the entire alkalinity to bicarbonate, carbonate and hydroxide, and assumes the absence of other weak acids of inorganic or organic composition, such as silica, phosphoric and boric.

This classification system assumes the incompatibility of hydroxide and bicarbonate alkalinities in the same sample. Since the calculations are on a stoichiometric basis, ion concentrations in the strictest sense are not represented in the results.

According to this scheme:

A. Carbonate alkalinity is present when the phenolphthalein alkalinity is not zero but is less than the total alkalinity.

B. Hydroxide alkalinity is present if the phenolphthalein alkalinity is more than one-half the total alkalinity.

C. Bicarbonate alkalinity is present if the phenolphthalein alkalinity is less than one-half the total alkalinity.

Relationships Between Phenolphthalein Alkalinity, Total Alkalinity, Carbonate Alkalinity, & Hydroxide Alkalinity

Result of Titration	Hydroxide Alkalinity as $CaCO_3$	Carbonate Alkalinity as $CaCO_3$	Bicarbonate Alkalinity as $CaCO_3$
P=0	0	0	T
P<½T	0	2P	T–2P
P=½T	0	2P	0
P>½T	2 (T–P)	2 (T–P)	0
P=T	T	0	0