

PHENOLPHTHALEIN/TOTAL ALKALINITY TEST KIT

MODEL WAT-MP-DR • CODE 4533-DR

QUANTITY	CONTENTS	CODE
100	Phenolphthalein Tablets	T-2246-J
100	BCG-MR Indicator Tablets	T-2311-J
60 mL	*Alkalinity Titration Reagent B	*4493DR-H
1	Test Tube, 5-10-15 mL, glass, w/cap	0778
1	Direct Reading Titrator, 0-200 Range	0382

***WARNING:** Reagents marked with a * are considered hazardous substances. Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before using.

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

NOTE: Read the Direct Reading Titrator Instruction Manual before proceeding. Each minor division on the Titrator scale equals 4 ppm CaCO₃.

(Continued on the next page...)

PHENOLPHTHALEIN (P) ALKALINITY PROCEDURE

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 does not turn red, P Alkalinity is 0. If solution turns red, proceed to Step 3.
3. Fill the Direct Reading Titrator (0382) with *Alkalinity Titration Reagent B (4493DR). Insert Titrator into center hole of test tube cap.
4. While gently swirling tube, slowly press plunger to titrate until red color disappears. Read test result where plunger tip meets Titrator scale. Record as ppm P Alkalinity as CaCO_3 .

EXAMPLE: Plunger tip is 3 minor divisions below line 80. The test result is 80 plus 12 (3 divisions x 4) equals 92 ppm.

5. If plunger tip reaches the bottom line on the Titrator scale (200 ppm) before the color change occurs, refill the Titrator and continue the titration. When recording test result, be sure to include the value of original amount of reagent dispensed (200 ppm).

NOTE: Do not move Titrator plunger after the P Alkalinity endpoint has been obtained. The titration is continued in the T Alkalinity procedure.

TOTAL (T) ALKALINITY PROCEDURE

6. Being careful not to move plunger, remove Titrator and cap from test tube containing sample that was titrated in Step 4.
7. Add one BCG-MR Tablet (T-2311). Cap and shake until tablet disintegrates. Solution will turn green-blue.
8. Reinsert Titrator in cap and continue titration until color changes from green-blue to pink. Read result where plunger tip meets Titrator scale. Record as ppm T Alkalinity as CaCO_3 . Be sure to include in test result value the total amount of titration reagent dispensed (i.e. see Step 5).
9. If only Total Alkalinity is to be tested, perform Steps 1,7 and 8 only, using a full Titrator in Step 8.

CALCULATION OF ALKALINITY RELATIONSHIPS

Results obtained from Phenolphthalein and Total Alkalinity determinations offer a means for the stoichiometric classification of three principal forms of alkalinity present in many water supplies. Classification attributes the entire alkalinity to bicarbonate, carbonate and hydroxide; and assumes absence of other weak acids of inorganic or organic composition, such as silicic, phosphoric, and boric. This classification system further assumes incompatibility of hydroxide and bicarbonate alkalinities in the same sample. Since 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 Phenolphthalein Alkalinity is not zero but less than the Total Alkalinity.
- B.** Hydroxide Alkalinity is present if Phenolphthalein Alkalinity is more than one-half the Total Alkalinity.
- C.** Bicarbonate Alkalinity is present if Phenolphthalein Alkalinity is less than one-half the Total Alkalinity.

Mathematical conversion of the result is shown in the following table:

**Relationships Between Phenolphthalein,
Total, Carbonate, Bicarbonate and 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
$P < 1/2T$	0	2P	T-2P
$P = 1/2T$	0	2P	0
$P > 1/2T$	2P-T	2(T-P)	0
$P=T$	T	0	0