



How to use...

Alkalinity Kit (Hach Model AL-AP)

INSTRUCTION SHEET



Testing Location – Field or Laboratory

If the sample is kept to conduct the test later in the laboratory, be sure to refrigerate the sample. It is best to conduct the test within 24 hours of collecting the water.

Testing Background

Which range to use? There are two ranges for this alkalinity test: high range (more than two drops of Sulfuric Acid needed) and low range (less than two drops of Sulfuric Acid needed). For most sampling, the high range test will be used. Start with it first. Both sets of instructions follow.

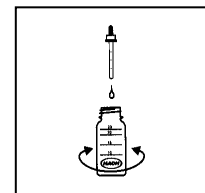
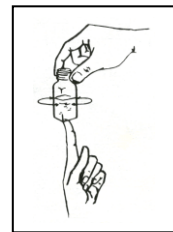
This test involves a titration process – an analytical procedure for determining the reactive capacity of a solution. A titration involves adding a reagent in small portions of known volume (or drops) to a known volume of a solution being tested until a desired end point (color change) has occurred.

Materials

- Phenolphthalein Indicator Powder Pillow
- Bromcresol Green-Methyl Red Indicator Powder Pillow
- Sulfuric Acid Standard Solution
- 2 plastic measuring tubes
- 2 square glass mixing bottles

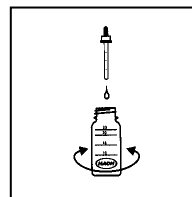
Test Instructions – High Range Test – START WITH THIS TEST RANGE

1. Fill the plastic measuring tube (not test tube) completely full with the water sample and pour into the square glass mixing bottle.
2. Add the contents of one Phenolphthalein Indicator Powder Pillow to the mixing bottle. Swirl to mix by placing one finger under the bottle and rotating the bottle back and forth with the other hand.
3. If the water remains colorless after the addition of phenolphthalein, the phenolphthalein alkalinity is zero. Proceed to step 6. If the water becomes slightly pink with the addition of phenolphthalein, proceed to step 4.
4. Add Sulfuric Acid Standard Solution drop-by-drop, holding the eyedropper straight up and down, to the pink mixing bottle. Swirl to mix after each drop, until the water becomes colorless. To make sure it is colorless, place it in front of a white background. Count and record the number of drops for later calculations.
5. The number of drops of sulfuric acid used is equal to the phenolphthalein alkalinity in grains per gallon as calcium carbonate (CaCO_3). To convert the grains per gallon (g/g) to milligrams per liter (mg/L) multiply the g/g value by 17. Proceed to step 6.



6. Now add the contents of one Bromcresol Green-Methyl Red Indicator Powder Pillow to the mixing bottle and swirl to mix. The color will change to blue-green.

7. Add Sulfuric Acid Standard Solution drop-by-drop, holding the eyedropper straight up and down, to the blue-green colored mixing bottle. Swirl to mix after each drop, until the water changes to a red/pink color. Make sure you swirl each time. Add drops until the SHADE of red/pink no longer changes. If you think the last drop added was not needed to complete the color change, disregard it. Count the number of drops that were needed to complete the color change to red/pink.



8. The green-methyl alkalinity in grains per gallon (g/g) as calcium carbonate (CaCO_3) is equal to the total number of drops of sulfuric acid used in step 7. To convert to mg/L (or ppm), multiply the g/g value by 17. Add this alkalinity value to the alkalinity calculated in step 5 (if performed) to find the total (methyl-orange) alkalinity of the water sample. Record this value on the data sheet. *NOTE: If very few (1 or 2) drops of sulfuric acid were used in the titration, follow the procedure (steps 9-17) for the low range test. This will make the low total alkalinity more accurate.*

Test Instructions – Low Range Test

9. Fill a CLEAN mixing bottle to the 15 mL mark with the water to be tested.

10. Add the contents of one Phenolphthalein Indicator Powder Pillow and swirl to mix by placing one finger under the bottle and rotating the bottle back and forth with the other hand.

11. If the water remains colorless, the phenolphthalein alkalinity is zero. Proceed to step 14. If the water becomes pink with the phenolphthalein, proceed to step 12.

12. Add Sulfuric Acid Standard Solution by the drop-count method (drop-by-drop, holding the eyedropper straight up and down, to the pink mixing bottle) swirling to mix after each drop. Continue adding and counting the drops until the water becomes colorless. Check to make sure it is colorless!

13. The phenolphthalein alkalinity in grains per gallon (g/g) as calcium carbonate (CaCO_3) is found by dividing the number of drops of sulfuric acid used in step 12 by 2.5. To convert to milligrams per liter (mg/L) alkalinity, multiply the g/g value by 17 [this is the same as multiplying the drops by 6.8 like done on the data sheet]. Proceed to step 14.

14. Add the contents of one Bromcresol Green-Methyl Red Indicator Powder Pillow to the mixing bottle and swirl to mix. The color will change to blue-green.

15. Add Sulfuric Acid Standard Solution drop-by-drop, holding the eyedropper straight up and down, to the blue-green colored mixing bottle. Swirl to mix after each drop, until the water changes to a red/pink color. Make sure you swirl each time. Add drops until the SHADE of red/pink no longer changes. If you think the last drop added was not needed to complete the color change, disregard it. This method is highly encouraged and guarantees accurate results. Count the number of drops that were needed to complete the color change to red/pink.

16. The green-methyl alkalinity is g/g as CaCO_3 can be found by dividing the number of drops in step 15 by 2.5. Convert this value to mg/L (ppm) by multiplying the g/g value by 17 [this is the same as multiplying the drops by 6.8 like done on the data sheet.] Add this to the alkalinity calculated in step 13 (if performed) to find the total (methyl-orange) alkalinity of the water sample. Record this value on the data sheet.

Disposal and Clean Up

Dispose of sample waste in a waste container to take back to the classroom. Once there, these wastes can be flushed down the sink with plenty of water. All glassware must be rinsed thoroughly with distilled water before using them again.

Safety Precautions:

Sulfuric Acid Standard Solution may cause a serious skin irritation; wash your skin immediately if contacted. If swallowed, Sulfuric Acid can cause blindness or be fatal. Do not inhale; vapors may cause respiratory tract irritation. The other chemicals in this kit may be hazardous to the user if inappropriately handled. Read all warning labels on the materials before use. Always use normal safety precautions.

