



Alkalinity Protocol



Purpose

To measure the alkalinity of the water sample

Overview

Alkalinity is closely related to the kinds of aquatic life that will survive in water.

Time

15 minutes

Level

Intermediate, Advanced

Frequency

Weekly

Calibration every six months

Key Concepts

- Alkalinity, natural factors affecting alkalinity
- Method of measurement of alkalinity
- Standardization
- Accuracy, Precision

Skills

- Using the alkalinity test procedure properly
- Recording data

Materials and Tools

- Alkalinity Test Kit (See *Toolkit*)
- Baking soda (sodium bicarbonate)
- Distilled water bottle
- Distilled water
- 500 mL beaker
- 100 mL graduated cylinder
- 500 mL graduated cylinder
- Stirring rod
- Data sheets
- Sample bottle
- Latex gloves/safety goggles
- Balance

Preparation

Complete the Calibration/Quality Control activities below. Bring the tools and materials to the water site.

Prerequisites

None



Calibration and Quality Control

Preparing the Baking Soda Standard

- Using your balance, weigh out 1.9 g baking soda and add it to your 500 mL graduated cylinder. Make sure to transfer all of the baking soda to the cylinder.
- Fill the 500 mL graduated cylinder to the 500 mL mark with distilled water.
- Pour this solution into the 500 mL beaker, and stir it with a stirring rod to make sure all of the baking soda has dissolved.
- Pour 15 mL from the beaker into the 100 mL graduated cylinder.

- Rinse the 500 mL graduated cylinder with distilled water first. Pour the 15 mL of your baking soda solution into the 500 mL graduated cylinder.
- Fill the 500 mL graduated cylinder to the 500 mL mark with distilled water.
- The solution in your 500 mL graduated cylinder is your standard.

The true alkalinity of this baking soda standard is 68 mg/L as CaCO_3 . The true value for distilled water is usually below 14 mg/L.



Quality Control Procedure

1. Do the alkalinity protocol below using the baking soda standard instead of your water sample.
2. Record the alkalinity value in mg/L as CaCO_3 on the Calibration Data Work Sheet.

If the baking soda standard is off by more than the mg/L equivalent of one drop or one gradation of the titrator for your alkalinity kit, prepare a new baking soda standard making sure your weights and dilutions are accurate. If you are still off by more than the mg/L equivalent of one drop or one gradation of the titrator for your alkalinity kit, you may need to get new reagents for your kit.

How to Measure Alkalinity

If your alkalinity kit has both a low range protocol and a high range protocol, use the low range protocol unless your water sample has an alkalinity greater than about 125 mg/L as CaCO_3 . This will enable you to make more precise measurements.

1. Use an alkalinity test kit which meets the *GLOBE Instruments Specifications* in the *Toolkit*. Follow the manufacturer's instructions. The kits are based on the technique of adding a color indicator to the sample and then adding an acid titrant dropwise until a color change is observed.
2. Record the total alkalinity in mg/L as CaCO_3 on the Hydrology Investigation Data Work Sheet.
3. Take the average of the alkalinity values measured by the student groups. If the recorded values are all within the equivalent in mg/L of one drop or one gradation of the titrator for your test kit of the average, report the average value to the GLOBE Student Data Server. If you have more than three groups and there is one outlier (a value far different from the rest) discard that value and calculate the average of the other values. If they are now all within the equivalent in mg/L of one drop or one gradation of the titrator for

your test kit of this new average, report this new average to the GLOBE Student Data Server. If there is a wide scatter (more than the equivalent of one drop or one gradation of the titrator) in results, discuss the procedure and the potential sources of error with the students, but do not report a value to the Data Server. Repeat the protocol to produce a reportable measurement.