**Lesson 2B: Acids and Bases**

Students will develop an understanding of the different properties of acids and bases. Students will begin to make the connections between negative impacts of increased acidity in our oceans.

**Learning Objectives:**

* Students will develop an understanding of the pH scale, and the properties of acids and bases
* Students will learn how scientists use the pH scale to measure ocean acidification.
* Students will understand that small changes in the scale represent a much larger shift in the chemical balance.

**NGSS Standards That Apply**

* **MS-LS2-3:** Develop a model to describe cycling of matter and flow of energy among living and nonliving parts of an ecosystem. *The living aspect of this standard will be achieved in conjunction with the shelled organism lessons.*
* **MS-LS2-4** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
  + Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems. *This standard will be achieved in conjunction with the shelled organism and data lessons.*

**Materials**

* Pencils
* Worksheet
* Safety goggles
* Bromothymol blue
* Tap water
* Drinking straws (1 per student)
* Clear paper cups or beakers (1 per student groups)
* Container for used straws
* Container for waste water

**Introduction**

Use the TED ED video to reintroduce the properties of acids and bases. Then move to the powerpoint presentation.

**Activity 1:** Ted Ed Video: Reviewing Acids and Bases (Follow along with the worksheet)

<https://www.youtube.com/watch?v=DupXDD87oHc>

**Activity 2:** Characteristics of Acids and Bases: Common Household Items Worksheet

**Activity 3:** Bromothymol Blue Model

This activity should tie everything together between Lesson 2A and Lesson 2B. Students will be increasing the amount of CO2 in their model ocean and observing the changes in acidity through an indicator. Blowing into the straws at different speeds will act as “wind” and agitate the bromothymol solution. Students should observe that blowing harder changes the indicator color more quickly.

1. Break students up into groups of 2 or 3. Each group will need two cups containing bromothymol blue solution, as well as straws and safety goggles for each student.
2. Instruct the students to use their straws to blow into one of their cups quickly and to do the same in the other but blowing slowly. What are students noticing? Are there changes depending on the speed (agitation!) at which they are blowing into the water.
3. Come together as a class. What did students observe?