**Objective:** To test how CO2 affects the pH of sea water at various salinities.

\*If students have previously completed the lab “Ocean Acidity and Temperature Change”, you may start at **part III** on the student directions (if pressed for time).

**Previous student knowledge:**

* students should understand that pH is a measurement of how acidic something is.
* students should be aware of various sources and properties of CO2 (both gaseous and solid). See lesson 2 for ideas.

\*If students have previously completed the lab “Ocean Acidity and Temperature Change”

**Materials:** this experiment is designed to make use of sensors connected to an interface such as a Vernier Labquest but pH paper could substitute. Also, student’s exhalation of CO2 is used as the source but this presents some problems in maintaining a colder temperature. CO2 may be generated, collected in a balloon and then released through a straw. See lesson 2 for directions. \*You could use room temperature water.

**Per lab group: LabQuest (or other interface)**

* pH sensor (Vernier or other)
* temperature sensor (Vernier or other; a regular thermometer is fine)
* 250 mL beaker (1 or more)
* 1.5 L of 3.2% saline ‘ocean’ water (this assumes no spillage)
* ring stand and clamp (or some way to support your sensors)
* graduated cylinder
* water bath (pan, larger beaker, so that ice water or warm water can be used to maintain temperature of the sample)
* straw(s) (wide straws work best, pipettes with bulb and tip cut off)
* Instant Ocean® or some other aquarium salt, table salt, or ESAW.

teacher to prepare in advance:

Obtain or prepare 1.5L ‘ocean’ water at 3.2% salinity per lab team. Refrigerate it, if possible, to save your students some time. (Students begin testing cold water since that is where the highest level of concern is and where diatoms thrive.) Decide if salt water is sufficient or if you want to use a ‘stock’ preparation (actual sea water or water made from aquarium preparations) that students will use in their diatom experiments. If you collect water, use a hydrometer to determine the specific gravity and then convert to PPT using [http://www.saltyzoo.com/saltycalcs/sgpptconv.php](http://www.saltyzoo.com/SaltyCalcs/SgPptConv.php). Add distilled water or more ‘salt’ (table salt or Instant Ocean®) until the desired salinity is obtained…or change the starting salinity on the student directions.

(Example: 3.2% = 32PPT = 3.2g/100mL; add salt to graduated cylinder and fill to 100 mL mark.)

\*When making a solution using ‘Instant Ocean®’ or some other aquarium salt, check your specific gravity with a hydrometer as the directions on the package may not be accurate.