Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ocean Acidification Lab Activity

**Background**

Shells (calcium carbonate) serve as a protective structure for both marine and terrestrial organisms. Marine ecosystems that depend upon calcium-carbonate to make shells, such as coral reefs or oyster beds, can be impacted by changes in ocean pH due to increased carbon dioxide. In experimental conditions under very high levels of CO2, shells of clams, oysters, corals, snails and urchin shells dissolve. If these organisms are unable to build or repair shells,

due to increased acidification caused by industrial emissions, deforestation and other human activities, they will likely cease to exist in these environments.

However, this is not the same response of all organisms. In experimental conditions, extreme increases in carbon dioxide result in crabs, lobsters, temperate sea urchins, limpets, and calcifying algae all building thicker shells with the more acidic conditions. Some organisms are able to adapt more rapidly than others, some will leave an environment if they cannot adapt and others may cease to exist in that environment. Nutrient levels, water temperature, food availability and habitat changes also can have an impact. Efforts to reduce that impact have the greatest chance of preserving some of these habitats.

**Hypothesis**

Predict the effect of the solutions on the pieces of shell*. Which solution will have the greatest effect on the chalk?* **Record your predictions below in the “IF . . . (expected conclusion) . . . THEN . . .(expected data)” format:**

**Materials**

* Chalk (calcium carbonate)
* pH test strips
* 3 cups of solutions (freshwater, salt water, and acetic acid)

**Procedure**

1. Test AND RECORD the pH (acidity) of each solution using the pH paper.
2. Make AND RECORD initial observations of the chalk. Be sure to consider texture, color, etc.
3. Place a piece of chalk in each cup.
4. Label each cup with one of the three solutions.
5. Add enough solution (1 per cup) to cover the chalk piece. Note the time!
6. Make AND RECORD observations of the chalk after 1, 5, and 10 minutes.

**Data**

|  |  |  |
| --- | --- | --- |
| Substance Tested | Observations | pH |
| Initial | 1 Minute | 5 Minutes | 10 Minutes |
| Freshwater |  |  |  |  |  |
| Salt Water |  |  |  |  |  |
| Acetic Acid |  |  |  |  |  |

**Conclusions**

1. Which substance had the greatest effect on the chalk?
2. Which substance had the most acidic pH (lowest number)?
3. From your observation of the chalk, what might be some consequences of ocean acidification for animals with shells?

**Additional References**

Acid Test: The Global Challenge of Ocean Acidification (20 minute movie on ocean acidification): http://www.nrdc.org/oceans/acidification/aboutthefilm.asp

Animation showing shell formation: www.whoi.edu/oceanus/viewArticle.do?id=52990

The Ocean in a High CO2 World: http://www.ocean-acidification.net/