Hands – On Science with NOAA

TITLE: Ocean Acidification and Dry Ice

OVERVIEW: Participants will explore the chemical reaction between frozen carbon dioxide (dry ice) and water and apply their findings to changes that are occurring in ocean ecosystems, as carbon dioxide in the atmosphere is absorbed by the Ocean.

MATERIALS: 2 Transparent Containers, 2 Drinking Straws, Bromothymol Blue Indicator Solution, Dry Ice, Water (preferably distilled).

INSTRUCTIONS:
http://coralreef.noaa.gov/education/educators/resourcecd/activities/resources/climatechng_sa.pdf

1. Add water and indicator solution to one of the containers. Then use the straw to blow bubbles into the water until it starts to change to a yellowish-green color. This represents the pre-industrial revolution ocean.
2. In the second container, add the same amount of water and indicator solution as in the first container. This time add a small piece of dry ice to the solution and it should change bright yellow. This is the post-industrial revolution ocean.

SCIENCE EXPLANATION:
Our ocean acts as a carbon sink and absorbs carbon dioxide from the atmosphere. In the past 200 years the amount of carbon dioxide in the atmosphere has increased by more than 35% due to the large amount of fossil fuels that have been used. A substantial part of this carbon dioxide is absorbed by the Ocean where the carbon dioxide reacts with water molecules to form carbonic acid, causing a decrease in the pH of the ocean water. This increased acidity negatively impacts the ability of many marine organisms to form their shells and other structural frameworks. In the demonstration the increased carbon dioxide levels, resulting from the dry ice, and the decreased pH as shown by the pH indicator, represent ocean acidification that is occurring due to human influences.

EXTENSION IDEAS

- Instead of dry ice, bubble smoke from a candle into the indicator solution.
- Investigate and discuss activities that students can do to reduce their carbon footprint?
- Use a pH meter to measure the pH.

EXPLORE FURTHER
Ocean Acidification
http://www.pmel.noaa.gov/co2/story/Ocean+Acidification
Ocean Acidification Data Activities
http://www.dataintheclassroom.org/content/oa/
Ocean Acidification For the Classroom
http://coralreef.noaa.gov/education/oa/