

Data Tables

Activity 1: Adding Gases to Ocean Water

Gas Produced	Initial Color of Solution	Final Color of Solution

Activity 2: Acidification and calcium carbonate

Cup	Initial Color of Solution	Initial Mass of CaCO ₃	Final Color of Solution	Final Mass of CaCO ₃	Change in Mass of CaCO ₃
Acid 1					
Acid 2					
Acid 3					
Control 1					
Control 2					
Control 3					

Activity 3: The Effect of Temperature on a Dissolved Gas

Carbonated Water	Initial Color	
	Final Color	
Non-carbonated Water	Initial Color	
	Final Color	

Activity 4: Acidification and Plants

	Initial Color	Final Color
Acidic with plant		
Acidic control		
Normal with plant		
Normal control		

Laboratory Questions

1. How did the gases affect the pH of the water?
2. Which gas is involved in ocean acidification? How do you know?
3. What are some natural and some anthropogenic sources of this gas?

Activity 2

1. What was the average change in mass of calcium carbonate for the acidic trials? What was the average change in mass for the control trials? How do the two averages compare?
2. How would a substantial increase in ocean acidity likely affect organisms that have calcium carbonate shells?

Activity 3

1. For each of your two trials as the water heated, what happened to the amount of carbon dioxide in the water? How do you know?

2. How did the pH of the carbonated and non-carbonated water compare before and after heating? Which of them showed a greater change in pH?

3. Would you expect to find more carbon dioxide in the waters of the Arctic or the Caribbean? Explain.

Activity 4

1. How did the tubes that contained plants compare with the tubes that did not? How did the acidic trials compare with the normal trials?

2. How do you think increased carbon dioxide levels would affect aquatic producers? Explain.

Discussion Questions

1. The following table shows historic, current, and predicted future ocean pH values as well as approximate carbon dioxide concentrations in the atmosphere.

	Average Ocean pH	Average CO ₂ (ppm)
Historic (1750)	8.16	280
Present (2010)	8.07	389.78
Future (2100)	7.67	650–970

- a. Explain why the quantity of carbon dioxide in the atmosphere has been increasing since the industrial revolution, which began in approximately 1750.
- b. Explain how increased production of carbon dioxide lowers ocean pH.
- c. Describe the effect of decreasing pH on marine organisms with shells or skeletons of calcium carbonate. How might this change affect the marine food chain?
- d. In addition to ocean acidification, describe another effect of increased atmospheric carbon dioxide.
- e. Identify reasons for the predicted continuing increase in atmospheric carbon dioxide.
- f. Explain why the prediction for 2100 shows a wide range of carbon dioxide levels.