

## CO<sub>2</sub> IN THE OCEAN FORM

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Name: \_\_\_\_\_ Section: \_\_\_\_\_

### **EXERCISE 1: *Determining a causal relationship between CO<sub>2</sub> and pH: Does a change in CO<sub>2</sub> cause a change in pH?***

1. Make note of the BTB starting color \_\_\_\_\_
2. From Figure 3, what pH range does this represent? \_\_\_\_\_
3. What is the new color of the solution after blowing in it? \_\_\_\_\_
4. From Figure 3, what pH range does this represent? \_\_\_\_\_

#### **Answer the following questions:**

A. What happened to the bromothymol blue (BTB) solution when you added carbon dioxide (CO<sub>2</sub>)?

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B. Based on what you observed in the experiment, how do you think increasing carbon dioxide levels affects the ocean?

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### EXERCISE 2: *Assessing the buffer capacity of seawater*

**TABLE 1. pH for the freshwater sample.**

Volume of Acid Added (mL)	pH
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

**TABLE 2. pH for the seawater sample.**

Volume of Acid Added (mL)	pH
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

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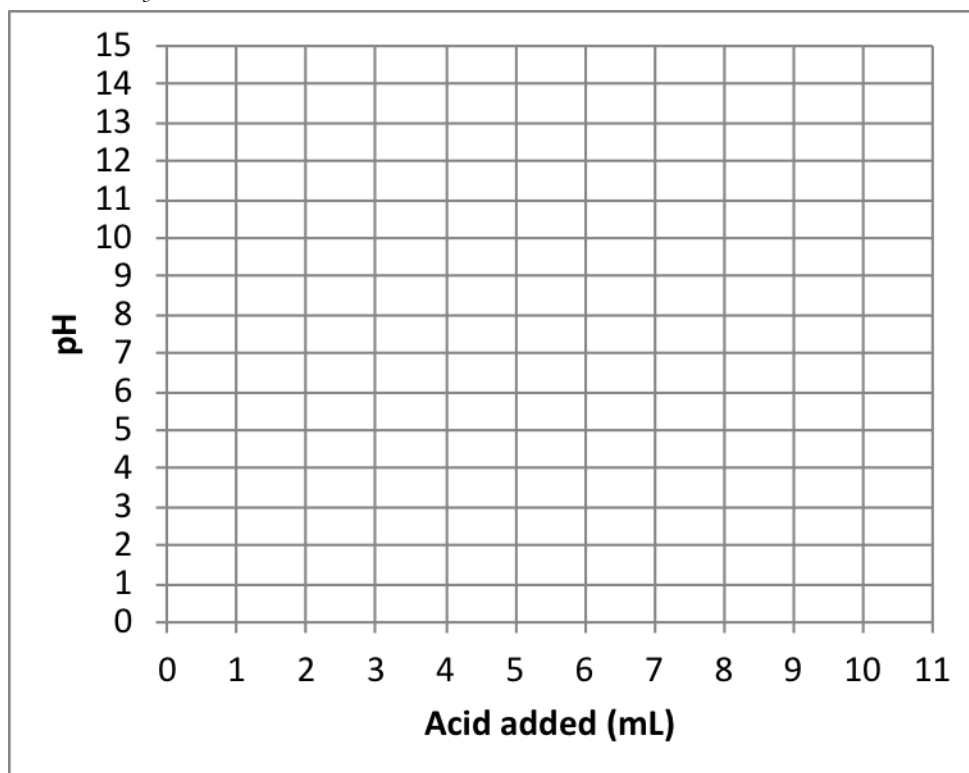
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**TABLE 3. pH for the seawater sample with added CaCO<sub>3</sub>.**

Volume of Acid Added (mL)	pH
0 ( <i>pH after adding CaCO<sub>3</sub></i> )	
1	
2	
3	
4	
5	

Draw the curves for each trial in Figure 5. Use a (o) for the Freshwater, a (x) for Seawater, and a (\*) for the Seawater after CaCO<sub>3</sub> added.



**Figure 5.** pH versus acid added for the 3 water samples.

Calculate the change in pH: (pH @ 0ml – pH @ 5ml)

DI water: \_\_\_\_\_

Seawater before CaCO<sub>3</sub>: \_\_\_\_\_

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**Seawater after CaCO<sub>3</sub>:** \_\_\_\_\_

**Answer the following questions:**

A. Which solution had the overall greater pH change after adding 5 mL of acid?

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B. Which solution had a faster rate of change?

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C. How did the seawater trials compare to the freshwater trials? Why are they different? Explain your answer.

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### EXERCISE 3: *The effects of acid on biology in the ocean*

Answer the following questions:

A. What happened when you added the acid?

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B. Describe the difference in the coral before and after the addition of the acid.

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C. Oysters make CaCO<sub>3</sub> shells. Oysters are a substantial commercial fishery. Considering this experiment, what might happen to Oyster Beds due to the recent increases in carbon dioxide in the atmosphere? EXPLAIN.

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### EXERCISE 4: *Explore the Flower Garden Banks*

**Answer the following questions:**

A. In addition to ocean acidification, coral reefs are threatened by ocean warming, which causes coral bleaching. What is coral bleaching and how does it harm corals?

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B. Identify the lion fish in the scene. Why are lionfish harmful for the FGB?

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