STE **Name**_____

Indicator/Environmental Chem Lab Activity **Partner**_____

Purpose: To understand how rain removes carbon dioxide from the atmosphere and how it dissolves carbonates from the lithosphere.

Equipment: 3 test tubes, new drinking straw, 10 ml graduated cylinder

Chemicals: limewater, dilute acid(0.1 M), dilute base(0.1 M), bromothymol blue

Procedure:

1. Measure 2.0 ml of limewater in a graduated cylinder.
2. Transfer the limewater to a small test tube.
3. Gently blow into the limewater until you see a change.

Record your observations.	
Explain your observations by completing the chemical equation with one single compound responsible for the cloudiness. Use the correct symbol to show that the new product is insoluble.	$CaO_{(aq)} + CO_2 \rightarrow$ _____

4. Blow gently into the mixture until you see another change. Don't give up easily; it may take a while.

Record your observations.	
Continuing to blow into water produces H_2CO_3(carbonic acid). This reacts with the insoluble **product** made in **step 3** to give the *soluble* $Ca(HCO_3)_2$. Complete the equation to summarize this. Use the correct symbol to show that the new product is soluble.	$H_2CO_{3(aq)} +$ _____ $\rightarrow$

5. To help you realize why the second change occurred, add base(NaOH) to your mixture from #4.

Record your observations.	
A base has the opposite properties to those of an acid. Every 2 moles of NaOH react with aqueous $Ca(HCO_3)_2$ to produce Na_2CO_3 and the product from #3 and one other common material. Complete the equation	2 NaOH + _____ → $Na_2CO_{3(aq)}$ + _____+ _____ Again use the proper symbol to show why the mixture got cloudy again.

6. To a clean test tube, add 1.0 ml of bromothymol blue.
7. Add acid to the test tube of bromothymol blue.

Record your observations.	

8. In a clean test tube, add 1.0 ml of bromothymol blue.

9. Gently blow into the bromothymol blue.

Record your observations.	
Explain your observations. Hint see explanation to #4.	

Summary of Observations and Analysis

1. Which of the above experiments (give step#) is evidence for the fact that rainwater can react with carbon dioxide from the atmosphere?

2. Which of the above experiments (give step#) is evidence for the fact that rainwater can also remove carbonate compounds from the lithosphere (soil and rocks)?

3. Which of the above experiments (give step#) is evidence for the fact that it is possible for organisms to take Ca^{+2} and HCO_3^- from sea water and turn into $CaCO_3$ which is found in sea shells?

Conclusion: