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| Quiz(14pts) |  |
| Completeness(10pts) |  |
| **GRADE:** |  |

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ APES

Mr. Crisci

**Lab: CARBON CYCLE** Date: **\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Introduction:**

One of the most common greenhouse gases is carbon dioxide (CO2), which can be found in the atmosphere, water, soil, the breath we exhale, car exhaust, etc. Because CO2 is produced by many common human activities it is important we monitor its concentration. One way to measure the concentration of CO2 is to use an indicator, such as BromoThymol Blue (BTB) solution.

Carbon dioxide has another characteristic that enables students to detect CO2 themselves. When dissolved in water, carbon dioxide forms a weak acid, called carbonic acid. The chemical bromothymol blue (BTB) is a sensitive indicator of the presence of acid. When gas containing CO2 is bubbled through a BTB solution, carbonic acid forms and the indicator turns from dark blue to green, yellow, or very pale yellow depending on the CO2 concentration (lighter colors mean higher concentrations).

**PROCEDURE:**

1. ***CAR EXHAUST COLLECTION***
2. Open the balloon slightly to fit over the hole of the cone.
3. Have an assistant turn on the car (make sure brake is on).
4. Approach the exhaust pipe from the side. Place the large end of the cone over the tail pipe.
5. **DO NOT BREATHE THE EXHAUST!!! IT COULD BE DEADLY!!!!**
6. The balloon will fill with exhaust to about 8-10 inched is diameter
7. Remove the balloon and twist tie it closed.
8. Label the balloon CAR EXHAUST if you think you will forget which is which.
9. ***ANIMAL (HUMAN) CARBON DIOXIDE COLLECTION***
	1. Get a new balloon.

\*\*Students should hold air in their lungs for a few moments to allow plenty of exchange between O2 being absorbed and O2 being released in their lungs. Breaths that are too rapid will contain less CO2 than normal exhalations.

* 1. Have one member exhale into the balloon.
	2. The balloon will fill with air to about 8-10 inched is diameter.
	3. Remove the balloon and twist tie it closed.
	4. Label the bag HUMAN CO2 if you think you will forget which is which.
1. ***FOR BOTH GAS FILLED BALLOONS***
2. Fill a large beaker with about 20mL with BTB solution. BTB is a Carbon Dioxide indicator, which turns green to yellow in the presence of carbon dioxide depending of the concentration.
3. Carefully fit the end of the balloon on the beaker and turn it over slowly allowing the solution to mix with gas. Then turn it right side up to check for color and pH change.
4. Record your results by placing where it falls on the scale below and use the laminated color chart to indicate a pH of the indicator. The more acidic the more yellow it will appear.
5. Compare your results with the pure CO2 from your teacher’s example.
6. Clean out BTB into waste container and rinse out beaker.

**BTB Indicator Solution Color Chart**

**Carbon Cycle Lab Questions:**

Blue

Low CO2

Concentration

Yellow

High CO2

Concentration

Green

Medium CO2

Concentration

1. Compare the colors in the tubes A and B to the color comparison chart with corresponding pH values provided to you by your teacher. What does the color of the solution tell you?
2. Describe the role of fossil fuels in the carbon cycle.
	1. How are you a part of this?
3. What are the main reservoirs of carbon?
4. As more carbon dioxide is dissolved into the oceans what will happen to the pH of the oceans? \_\_\_\_\_\_\_\_\_\_
	1. Explain how this change affects certain organism in the ocean:
5. Using up/down arrows to indicate increase or decrease, how would the distribution of atmospheric carbon be altered if:
	1. We stopped burning all fossil fuels?
	2. Cut down all trees?
	3. Stopped eating beef?
	4. Changed to all electric vehicles?
	5. World population decreases?
6. On the bottom of this paper, draw a picture of the flow of carbon in all of the different experiments in the lab. Label a place *on land* **and** *in the ocean* where you might find it as a solid and a gas. Connect all parts to each other using arrows that depict the flow.

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