**Environmental Science B Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Period\_\_\_\_\_\_\_\_\_**

**Detection of Carbon Dioxide in Automobile Exhaust**

A compound called phenolphthalein is used commonly in laboratories to indicate when a solution goes from acid to alkaline or the reverse. In class we showed carbon dioxide neutralizing lime water. When that happens a phenolphthalein solution will go from pink to clear.

**Hypothesis:**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Procedure**

1) In this experiment we need to place 3 milliliters (3 mL) of distilled water into the 10 mL graduated cylinder.

2) Locate the lime water test tube in your kit. Get one of the plastic squeeze bulb pipettes from your kit and use it to transfer 1 mL of lime water to the graduated cylinder.

Lime water is water that has the maximum amount of calcium hydroxide dissolved in it. That's about 0.1% w/v (meaning 0.1 grams calcium hydroxide in 100 ml of water). It's a weak alkaline solution.

3) Now you can pour the 4 mL of the diluted lime water out of the graduated cylinder and into the 50 mL beaker. Take a strip of pH paper and record your results here:

pH = \_\_\_\_\_\_\_\_\_

4) Add two or three drops of the phenolphthalein solution to the beaker. You will see a pinkish purple appear. That means the phenolphthalein is changing colors because it’s in an weak alkaline solution.

If the solution doesn't turn pinkish purple, then it's possible that the lime water got neutralized by carbon dioxide (CO2) in the air. If you see no color, take just a few grains of baking soda from the test tube labeled "Sodium bicarbonate (baking soda)" and add that to the solution and stir. That should make the solution turn purple. If not, add a little more baking soda.

Take a picture of the pink solution.

5) Take your beaker out to your vehicle. Start up the vehicle and hold the 50 mL beaker somewhat close to the exhaust pipe (don't burn any fingers). Start the vehicle and record the number of seconds it takes to get a color change. If you do not get a color change after 60 seconds, then stop.

Take a picture of the clear solution.

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| **Vehicle Make** | **Vehicle Model** | **# of Seconds for color change** | **Comments** |
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6) Return to the classroom and immediately test the pH again with a strip of pH paper and record your results here:

pH = \_\_\_\_\_\_\_\_

7) Collect class data and graph your results.

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| **Vehicle Make** | **Vehicle Model** | **# of Seconds for color change** | **Comments** |
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7) Write one paragraph that describes the potential threats of putting Carbon Dioxide, from burning fossil fuels, into the atmosphere.