Rebekah Huebscher

Kris Johanson

Biology

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Making Carbon Dioxide

Purpose: To make carbon dioxide and to show its purposes.

A. Carbon Dioxide Monitor

I. Purpose. To see how much carbon dioxide humans breathe out.

II. Materials. Carbon Dioxide Monitor, human breath, everyday air.

III. Methods. Someone breathed on the monitor. For the second number, the monitor was left alone for a few minutes.

IV. Results. The monitor number reached 3,000 ppm, even though the measure of the regular air is about 400 ppm.

V. Conclusion. Humans breathe out a large amount of carbon dioxide.

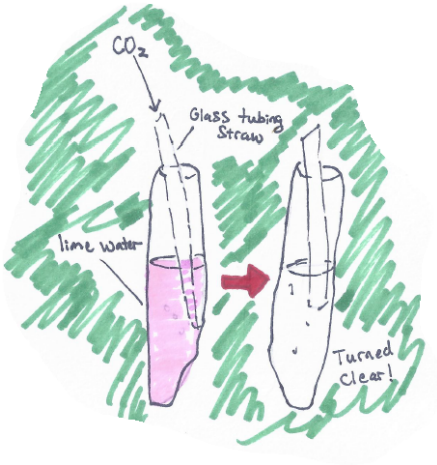
B. Lime Water

I. Purpose. To show that carbon dioxide will make substances slightly acidic.

II. Materials. Test tube, lime water infused with pH powder, glass tube straw, human breath.

III. Methods. The test tube was filled about half with the lime water infused with pH powder. The straw was inserted into the test tube and through the straw human breath was blown into the compound for about 2 minutes.

IV. Results. The lime water compound turned from bright pink to clear, representing the pH had changed. The pH was originally 8, but after the liquid changed colors, the pH was tested at 6. A pH of 8 is slightly basic, and a pH of 6 is slightly acidic.



V. Conclusion. Carbon dioxide makes lime water acidic.

$$Ca(OH)_2 + H_2O \text{ ----> } H_2CO_3 + CaCO_3 + H_2O$$

Lime — Water — Carbonic Acid — Calcium Carbonate — Water

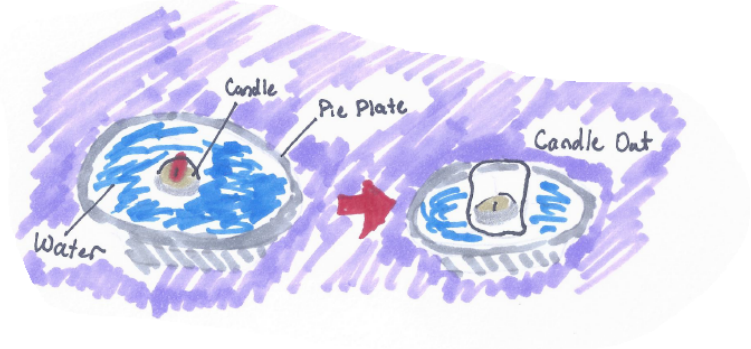
C. A Candle in the Pie Plate

I. To see how fire burns without oxygen.

II. Glass pie plate, butane burner, candle, beaker, water.

III. The candle was placed in the center of the pie plate, where it was surrounded by water. The candle was finally lit after several attempts, and the beaker was placed over the lit candle.

IV. The candle went out almost immediately.



V. The candle burned all the oxygen in the beaker, fire needs oxygen to keep burning, and so the candle went out.

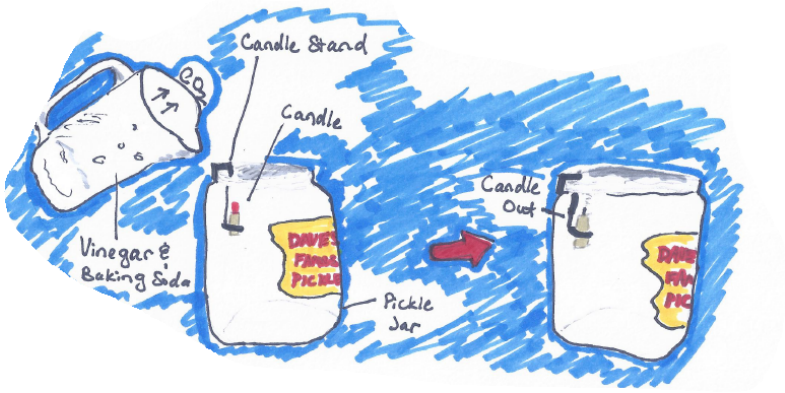
D. A Candle in a Jar

I. To see how pure carbon dioxide cannot allow fire to burn.

II. Large jar, candle, butane burner, wire candle holder, baking soda, vinegar, plastic pitcher, cover for pitcher.

III. The vinegar and baking soda were added to the pitcher, where they were immediately covered with only a small space left for an air pocket. The candle, on the stand, was lit and lowered into the jar. After the vinegar and baking soda were left alone for a minute, the pitcher was tipped at an angle on the edge of the jar without pouring the contents of the pitcher.

IV. After the baking soda and vinegar were added to the pitcher, they reacted and began bubbling. Together the baking soda and vinegar created carbon dioxide, and the air pocket was left so that the oxygen could escape. When the pitcher was tipped slightly, the carbon dioxide gas filled the large jar, and the candle went out.



V. Carbon dioxide is heavier than air, so it gets rid of oxygen.

$NaHCO_3$ + $C_2H_4O_2$ -------> CO_2 + NaC_2H3O_2 + H_2O
baking soda vinegar carbon dioxide sodium actuate water