

Preparation and Properties of Carbon dioxide

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Description: Roughly measured amounts of baking soda and vinegar are mixed in a large transparent container producing carbon dioxide gas. After the bubbling stops, the properties of carbon dioxide are demonstrated in various ways.

Materials: 1 box of baking soda
1 bottle of white vinegar
1 bottle of bubble soap and bubble wand
2 - 400 ml beakers or plastic drinking cups
1 candle and 1 box of matches
1 plexiglass tank (11 inches on each edge is suggested)

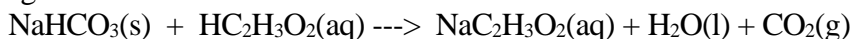
Procedure: Production of carbon dioxide

- 1) Sprinkle about 1 cup of baking soda into tank.
- 2) Pour 1-2 cups of vinegar into tank.
- 3) Discuss the chemical reaction. If appropriate for your audience, write the chemical equation on the board.

Properties of carbon dioxide

- 4) Light a match and slowly lower it into the tank. When it reaches the top of the CO₂ layer, it will go out.
- 5) Blow several bubbles over the tank until a few fall inside. They will float on the heavier gas. (You almost always hear one or two "wow"s at this point.)
- 6) Light the candle and stand it on the tabletop.
- 7) Slowly scoop a beaker full of CO₂ from the bottom of the tank and pour the contents into the second beaker. Now extinguish the candle by pouring the heavy, nonflammable gas onto the flame.

Discussion: In this demonstration, very common household reagents are used to generate carbon dioxide gas. The chemical reaction can be written as:



If your tank is 11 inches on each edge, its volume is about 22.4 liters (the volume of 1 mole of an ideal gas at 1 atm. and 0 C). From up close you can see the suspended bubbles slowly enlarge. This is caused by CO₂ passing into the bubble by dissolving in the water between the soap layers. Extinguishing the candle by pouring the CO₂ on the flame shows that gases, as well as liquids, are fluids.

Hazards: Very few hazards are present here. Safety goggles are recommended. Normal precautions should be used when using the matches and candle.

Disposal: The reaction mixture can be flushed down the sink.