

# THE NON-BURNING PAPER

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### 1. MATERIALS NEEDED:

Isopropyl alcohol (2-propanol) 90% or higher. Note: ethyl alcohol, 95 % can also be used.  
water  
2 beakers, 400 mL  
beaker, 800 or 1000 mL  
tongs, such as crucible tongs  
candle (or Bunsen burner)  
paper. Cut in strips about 6 cm x 15 cm (2.5 x 6 inches)  
optional: salt, sodium chloride, NaCl

### 2. SAFETY PRECAUTIONS:

Wear safety goggles or glasses

Alcohol is flammable. Keep the container covered when not in use or when flames are nearby.

This experiment presents a fire risk. A fire extinguisher must be available.

The work area must be covered with a fireproof cover.

A metal pie pan or similar container is useful for containing ashes from the paper.

### 3. DISPOSAL:

There are no disposal hazards in this experiment. Solid waste, when cool can be disposed of in the trash. The liquids can be poured down the drain if local regulations permit.

### 4. PROCEDURE:

Pour 100 mL of isopropyl alcohol into a 400 mL beaker. Cover the beaker with an inverted 800 or 1000 mL beaker.

Pour 100 mL of water into a 400 mL beaker.

Pick up a piece of paper with the tongs and hold it over a burning candle. What happens?

Pick up a piece of paper with the tongs, dip the paper into the water, and hold it over a burning candle. What happens?

Pick up a piece of paper with the tongs, dip the paper into the alcohol, and hold it over a burning candle. What happens?

Apparently, the wrong kind of paper was used. Try a dollar bill (does anyone have a one hundred dollar bill? A fifty? A twenty?, etc.) While the audience is searching for a dollar bill, pour the WATER INTO THE ALCOHOL without any comment.

Hold the dollar bill with the tongs, dip it into the water-alcohol mixture, and hold it over a burning candle. What happens?

#### **5. EXPLANATION:**

Paper burns when held in a flame. When wet (with water) paper will not burn. When wet with alcohol, both the alcohol and the paper will burn. When wet with a mixture of about 50% alcohol and water, the alcohol will burn, but there is sufficient water so that the paper will not burn.

Generally, about 50%, or more, of the audience will not realize you poured the water into the alcohol.

#### **6. UTILIZATION AND VARIATIONS:**

Isopropyl alcohol burns with a yellow flame and is visible throughout the room. Ethyl alcohol burns with a blue flame. To make the ethyl alcohol flame more visible, add a small amount of table salt, NaCl, to the alcohol.