

# THE NON-BURNING PAPER

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### MATERIALS NEEDED:

ethyl alcohol, 95 %  
water  
salt, sodium chloride, NaCl  
paper. Cut in strips about 6 cm x 15 cm (2.5 x 6 inches) NOTE: A small towel can also be used.  
beakers, 2, 400 mL  
beaker, 800 or 1000 mL  
tongs  
candle  
flame proof board

### SAFETY PRECAUTIONS:

Wear safety goggles or glasses

Ethyl 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 should be available.

### 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.

### PROCEDURE:

Pour 100 mL of ethyl alcohol into a 400 mL beaker. Add a few crystals of salt (sodium chloride). Cover the beaker with an inverted 800 or 1000 mL beaker or a watch glass.

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? (Note: This is chemistry! Cellulose, which is a compound composed of carbon, hydrogen, and oxygen, is combining with oxygen from the air, producing heat, light, carbon dioxide, and water vapor.)

Pick up a piece of paper with the tongs, dip the paper into the water, and hold it over a burning candle. What happens? Ask the audience. (Note: You are looking for an audience member to tell you that the paper does not burn “because it is wet.”)

Summarize for your audience: “When placed in a flame, a piece of paper burns. But the paper will not burn when it is wet. Is that correct?” While you are speaking, pick up a piece of paper with the tongs, dip the paper into the alcohol. As the audience confirms that your statement is correct, hold the alcohol soaked paper over a burning candle. What happens? (Note: Look a little surprised.)

Apparently, the wrong kind of paper was used. Try a a different kind of paper. Ask: “Does anyone have a hundred dollar bill?” (Note: You may have to ask for a twenty, or a ten, or finally settle for a one dollar bill. CAUTION: If using currency from another country, make sure the “paper” money is not made from plastic.) While the audience is searching for a dollar bill, misdirect the attention of the audience. Try to select someone from the back of the room and ask questions such as “Don’t you have a hundred dollar bill?” “It this your lunch money?” “If this doesn’t work, will you be able to take the bus home?” Meanwhile, 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?

#### **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. The salt will give the alcohol flame a slight yellow color making it more visible to the audience.

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