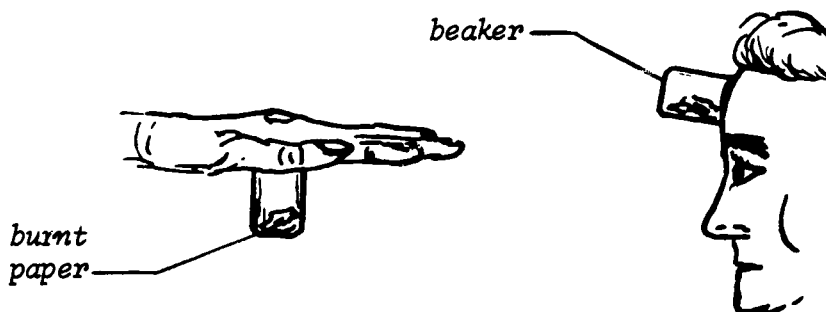


AIR

EXPANSION BY HEAT
EXERTING PRESSURE1.25. THE MAGIC BEAKER

- Materials:
1. A small jar (50 ml) or small wine glass.
 2. A piece of paper and matches.

Procedure:

1. Show that the jar or wine glass is empty by inverting it.
2. Crumple a small piece of paper.
3. Strike a match and start burning the paper.
4. Place the burning paper in the jar or wine glass and immediately press the jar against your forehead or against the palm of your hand (keep pressing until the fire is out or until you feel a suction).
5. When you feel a suction inside the jar, slowly let go of it (it will stay stuck against your forehead or palm).

Questions:

1. What was inside the jar or glass before burning the paper?
2. Why did the flame inside the jar go out?
3. What does the heat of the flame do to the air inside the jar?
4. What was left inside the jar after the flame went out?
5. What made the jar or glass stick to the forehead or palm?

Explanation:

Although you showed the pupils that there was 'nothing' in the jar by holding it upside down, there was naturally air in it. By placing the burning piece of paper in the jar, the air inside the jar was heated and expanded. The expansion made the air rush out of the jar and when pressed against the forehead or palm of the hand, the jar was closed off from the outside air. This caused the flame to go out, because there was no more oxygen to feed the burning process. The extinguishing of the flame caused the air inside the jar to cool off and thus to contract. The pressure inside the jar was therefore getting smaller than the atmospheric pressure outside the beaker, and this higher air pressure kept the jar against the forehead or palm. In other words, a **partial vacuum** was created inside the jar, which kept the jar stuck against the skin surface.

Warning: The partial vacuum will leave a red spot on the skin, which will disappear in a few hours or longer, depending on how long the beaker has been left against the skin!