

DECREASE IN VOLUME

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MATERIALS NEEDED:

Glass tube, approx. 100 cm long x 1 cm diameter
Ethanol, 100%, absolute (special reagent denatured can be used) 50 mL
small beakers (2), 50 or 100 mL
funnel to fit glass tube
corks to fit glass tube
food color
water

SAFETY PRECAUTIONS:

Wear safety goggles or glasses

Ethyl alcohol is flammable. Avoid flames.

Do not substitute a plastic tube for the glass tube. A vacuum is created in the tube and the plastic will break.

PROCEDURE:

Add red food color to approximately 50 mL of water.

Stopper one end of the glass tube. Using a funnel, slowly fill the glass tube about half-full with the colored water.

Fill the glass tube the rest of the way with the absolute ethyl alcohol. Stopper the tube. There should be a small air bubble at the top of the tube.

Invert the glass tube and observe the air bubble as it moves to the top of the tube.

Invert the tube again, and observe the air bubble.

Continue to invert the tube, over and over, until the alcohol and water are well mixed and the color is uniform throughout the tube. Observe the air bubble.

EXPLANATION:

Both ethyl alcohol and water are polar. The alcohol will be hydrated by the water molecules. The attraction of the alcohol molecules for the water allow the different molecules to get closer to each other than the water to water or the alcohol to alcohol. Thus, the mixture takes up less total volume than the sum of the original volumes of the two liquids.