

LAB ACTIVITY**Heat Transfer By Convection**

INTRODUCTION: This lab will demonstrate how currents caused by differences in density transfer heat through fluids. This method of energy transfer is believed to occur in Earth's mantle below the lithosphere and also occurs in the hydrosphere and atmosphere.

Movement of Earth's tectonic plates is believed to be the result of mantle convection. Within the atmosphere, differences in temperature cause the density variations that result in convective flow. This causes the basic forces that drive winds.

OBJECTIVE: You should be able to predict convection patterns in fluids and describe the effects of varying densities of fluids.

VOCABULARY:

convection:

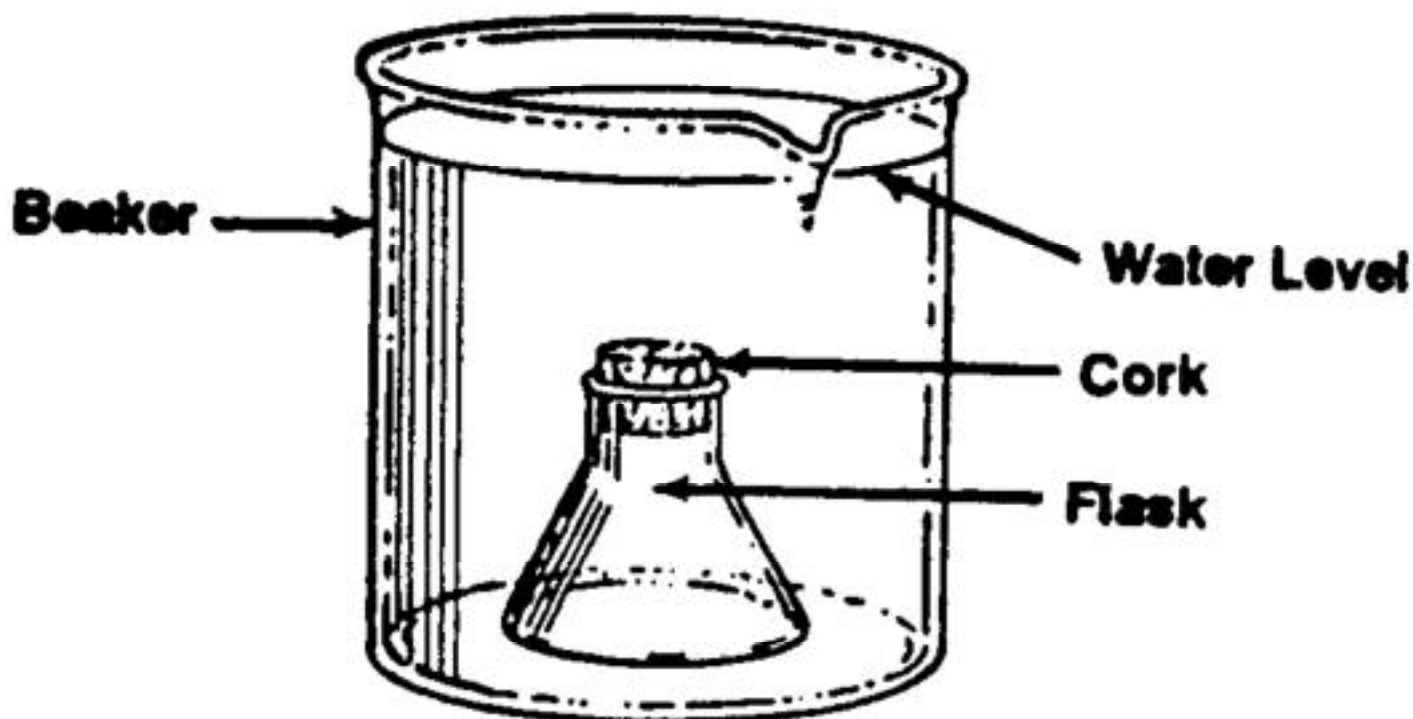
fluid:

convection cell (current):

Earth's mantle:

PROCEDURE:

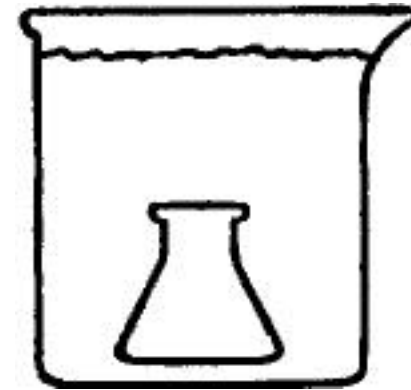
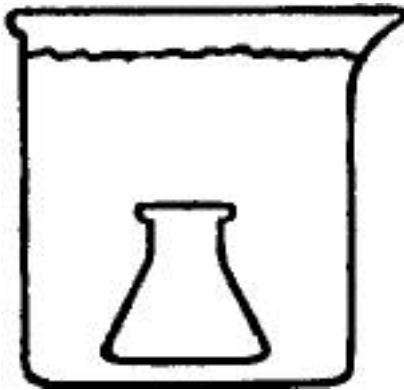
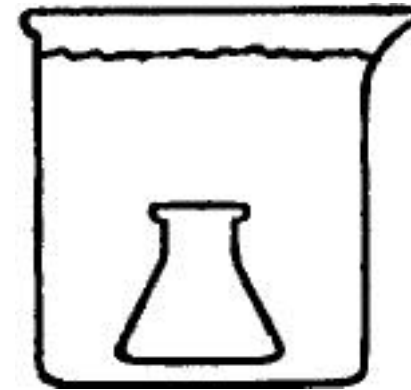
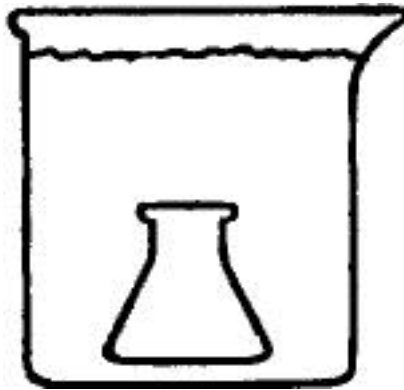
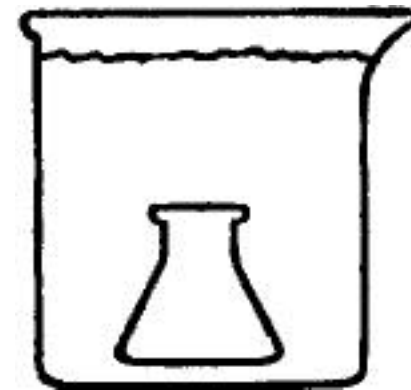
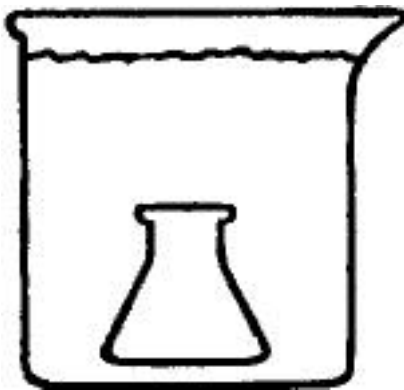
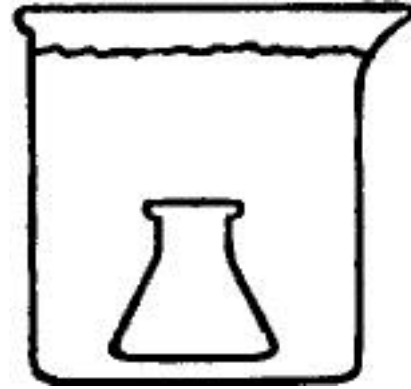
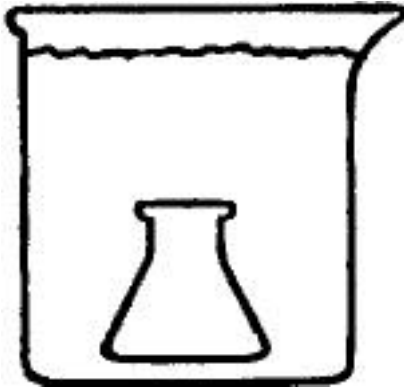
1. Place 800 ml of cold water in a 1000 ml beaker. Let it stand undisturbed.
2. Put 4 drops of dye in a 50 ml flask.
3. Nearly fill the flask with hot water leaving enough space for the cork stopper.
4. Moving as slowly as possible so as not to disturb the water, lower the flask to the bottom of the beaker of cold water.
5. Holding the flask with tongs, carefully remove the stopper and gently remove your hand from the beaker. This will be "Time 0". Observe what happens.
6. On your Report Sheet, draw and completely label diagrams of the apparatus at Time 0 and at 3 subsequent times.
7. Clean your equipment and repeat the procedure using hot water in the beaker and cold water in the flask.



REPORT SHEET

Cold Beaker of Water
Warm Dye

Warm Beaker of Water
Cold Dye



DISCUSSION QUESTIONS: (Answer in Complete Sentences)

1. Describe the pattern of movement of the hot dye during the first two observations.
2. Describe the pattern of movement of the cold dye during the first two observations.
3. Why didn't the cold dye immediately rise into the warm water?
4. What difference in densities caused the pattern of movement observed when the hot dye was placed in cold water?
5. What happens to the density of a fluid when heat is applied?
6. Draw a diagram of a convection cell of air that would exist in a closed room with a heater on one side.

