

Your Name

Professor's Name

Course Title and Number

Due Date

Laboratory Report:

Lava Lamp Experiment

Most people have seen a Lava Lamp and enjoyed watching the flow and the motion of it. Such lamps work on thermo and fluid dynamics. Whilst our lava lamp is experimental, what we describe here is not as dramatic as an experiment with the purchased one; the lamp will demonstrate the main fluid and thermodynamic properties of such. In our experiment the lava lamp shows convection, surface tension, buoyancy, fluid drag, and density.

During the experiment, the following materials were used:

- 1x 800 ml beaker
- 1x 100 ml graduated cylinder
- 1x hotplate
- 10 ml fountain pen ink
- 90 ml water (graduated cylinder)
- 600 ml vegetable oil (beaker)

Heated Convection Experiment:

1. Pour 600 ml of the vegetable oil into the beaker.
2. Pour 90 ml of water into the graduated cylinder.
3. The water and vegetable oil must be mixed, then left to stand until the water settles at the bottom with the oil on top.
4. Pour 10 ml of the ink into the graduated beaker, and, from it, pour the ink into the beaker with the oil and water.
5. The ink will form droplets on top of the oil/water, but will not break through, because of the surface tension.
6. Heat the beaker on the hotplate until it reaches 100 degrees Celsius (at sea level). Soon convection

will take place, the 'lava lamp' should begin to convert because the water is at its boiling point. Once it boils, do not leave it on boil too long, or the contents could splash out.

The experiment shows the connection between buoyancy and density.

Convection: Heat convection occurs, because, when a liquid is heated the density of the liquid at the bottom is lesser, than the density of the liquid on the top. This causes it to flow to the top, as it is less dense, and it is more buoyant, than the colder liquid. At the same time, the colder liquid on top flows downward, because it is more dense and, therefore, less buoyant. This process continues as the liquid undergoes convective flow. This causes the up and down flows.

Drag is the next force: Fluid drag is a force that opposes the movement of the droplets in the oil, due to friction between the droplet and the oil surrounding it. When the drop was not moving, there was no drag force in operation. Once the convection takes place, drag is experienced and the drops move at a different speed.

Hydrophobia is the other force: The oil causes the water and ink to bead together as distinct drops as it moves on the convection flow. However, the oil rejects water. The water and ink, therefore, do not blend with the oil, but strays distinct and suspended, moving up and down on the convection currents. Thus, the lava lamp works according to these principles.