DIY Lava Lamps

Today, we will be making our own lava lamps! Did anyone else have a lava lamp when they were younger? I did! I always thought it was cool to watch the bubbles rise to the top and morph into one big bubble before falling again. Then, I learned that this action is due to chemistry.

The rising and falling of the bubbles in lava lamps is due to the density and polarity of its substances. Density is how tightly packed a substance is. In liquid, objects denser than the liquid

will sink and objects less dense than the liquid will float. For example, if you drop a rock into a pool, the rock will sink to the bottom; the rock is denser than water. The molecules that make up the rock are more tightly packed than those that make up water. If you drop a Styrofoam pool noodle into the same pool, the noodle will float; Styrofoam is less dense than water. The molecules that make up Styrofoam are less tightly packed than the molecules that make up water.

When we perform this experiment, we will use oil and water. Water molecules are packed more tightly than oil molecules. Based on this knowledge, which of the two will float and which will sink?

Polarity is also important in this experiment. This property prevents oil and water from mixing. Water is a polar molecule. When we talk about polarity, we mean that part of the water molecule (the oxygen) has a slight negative charge, and part of the water molecule (the hydrogen) has a slight positive charge. The negative part of water will be attracted to the positive part of other molecules and other water molecules. The positive part of water will be attracted to the negative part of other molecules. Think of water like a magnet, with positive and negative ends. Magnets will attract other magnets, as their positive and negative ends are attracted to each other.

Oil molecules are not polar, so they do not have the same charges that water molecules do. Oil molecules will not be attracted to water molecules, so when they are in the same place, you can see a separation between the substances.

Now, Alka-Seltzer tablets will be used as the power source of our lava lamps. The tablets will chemically react with water to produce gas bubbles, which can be attracted to the charged water molecules. When water and gas interact, they are less dense than the oil. Where do you think they will go? Up is right. When the bubbles reach the top of the bottle, they pop and so the water left over will sink again.

You will need: an empty water bottle, or any clear plastic bottle, vegetable oil, water, food coloring, and an Alka-Seltzer tablet.

1. Fill the water bottle most of the way with vegetable oil. Then, fill the rest with water. Where does the water go when you pour it in? Why does it move this way?
2. Add some food coloring. Where does the food coloring travel in the water bottle? Hint: food coloring has a water base, so based on what we just saw, why do you think it moved this way?
3. Break an Alka-Seltzer tablet into small pieces and drop them into the bottle. The tablet will create bubbles and you will see things move in your bottle like a lava lamp.
4. When the bubbles die down, add more Alka-Seltzer to see more activity.

As a review, why did the water and oil separate in our experiment? Hint: there are two reasons. Why did the Alka-Seltzer tablet allow the bubbles to rise in our lava lamps?