

Lesson Name: Lava Lamps

Lesson Type: Demonstration/Do-it-yourself

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[http://www.youtube.com/watch?feature=player\\_embedded&v=WayviQkusxl](http://www.youtube.com/watch?feature=player_embedded&v=WayviQkusxl)

### Background:

A traditional lava lamp contains blobs of colored wax inside a glass vessel filled with clear liquid; the wax rises and falls as its density changes due to heating from an incandescent light bulb underneath the vessel. (See picture to the right)

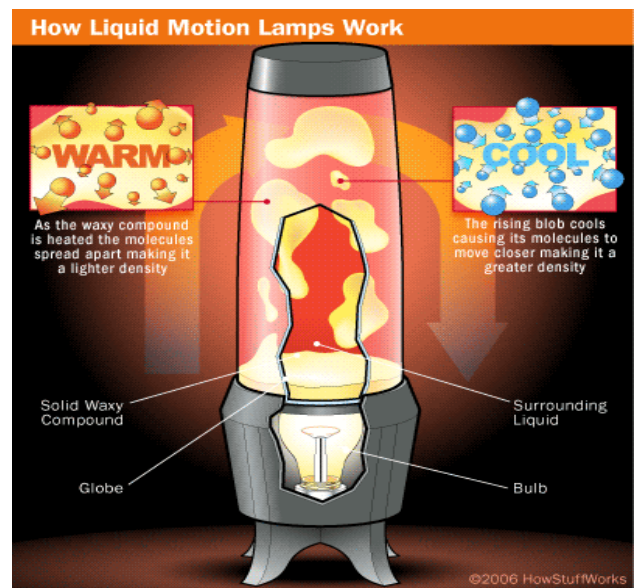
In this lesson plan an analogous lava lamp will be made with oil and water. This lava lamp will exploit the same properties of density.

### Material:

- Plastic or glass bottle
- Water
- Vegetable oil
- Funnel (optional)
- Food coloring
- Alka-Seltzer or other antacid tablets
- Flashlight (optional)
- Glitter (optional)
- Torch (optional)

### Procedure:

1. Take the clear bottle and fill a quarter of it with water
2. Fill the rest of the bottle close to the top with vegetable oil
3. Let the mixture separate
4. Add a few drops of food coloring, and if you have glitter you can add that too
5. Break up some Alka-Seltzer tablets and drop them into the mixture, and enjoy the lava lamp as it bubbles



A torch or a flashlight can be shone behind or underneath the lava lamp to watch it glow. If you want to keep the lava lamp use a bottle with a cap or a lid so that you can put it back on when you have finished. To restart the lamp simply add more Alka-Seltzer tablets.

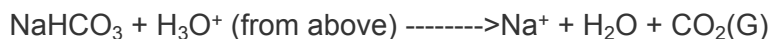
### What can be discussed:

Talk about the property differences between water and oil. They are obviously both liquids, but they vary considerably. The reason we do this is because it is always good for scientists and engineers to understand the properties of the material they work with. (Vary how in depth you go into this depending on elementary or high school. Topics could be color, viscosity, polarity,

etc)

After you start the procedure the first thing you notice is when you make the water and oil mixture in the bottle. Point out the density difference of the two. Oil is less dense than water, so it sits on the top of the water. When you add in the food coloring notice where that settles as well.

Alka-Seltzer is a combination of sodium bicarbonate, aspirin (acetylsalicylic acid), and anhydrous citric acid. The citric acid and the aspirin dissociate to produce the hydrogen ion. The hydrogen ion then reacts with the bicarbonate to produce carbon dioxide which appears as bubbles.



The gas bubbles rise up and take some of the food coloring and water with them to the surface of the oil. When the gas in the bubbles escape through the top of the bottle, the water droplets fall back to the bottom. When all the gas has escaped, the water and oil separate into two layers again.

If you want to go more in depth there is an interesting concept of mass transport with the bubbles. Bubbles are one way to make mixtures well-mixed in reactors.

#### References:

<http://www.planet-science.com/categories/experiments/chemistry-chaos/2011/07/make-a-lava-lamp.aspx>