Salt Volcano

15 minutesWhat do I need?

* A glass jar or clear drinking glass
* Vegetable oil
* Salt
* Water
* Food coloring (if you want)

DANGER!
Don't forget to be careful with glass.
Mixing Ingredients

What do I do?

1 Pour about 3 inches of water into the jar.

2 Pour about 1/3 cup of vegetable oil into the jar. When everything settles, is the oil on top of the water or underneath it?

3 If you want, add one drop of food coloring to the jar. What happens? Is the drop in the oil or in the water? Does the color spread?

4 Shake salt on top of the oil while you count slowly to 5. Wow! What happens to the food coloring? What happens to the salt?

5 Add more salt to keep the action going for as long as you want.
What's going on?

Wow! I didn't know that!

Lava Lamps are lamps that were invented by an English man named Craven Walker in 1964. They are basically tall thin glass jars filled with liquid and a special kind of colored wax, set on top of a base with a light bulb. When the bulb is turned on, the lamp glows, the liquid heats up, and the wax begins to melt. Blobs of wax rise to the top of the lamp, then cool and sink back down--over and over again.

Why does the oil float on the water?

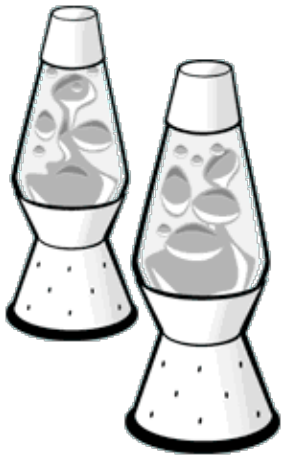
Oil floats on water because a drop of oil is lighter than a drop of water the same size. Another way of saying this is to say that water is denser than oil. Density is a measurement of how much a given volume of something weighs. Things that are less dense than water will float in water. Things that are more dense than water will sink.

Even though oil and water are both liquids, they are what chemists call immiscible liquids. That's a fancy word that means they don't mix.

What happens when I pour salt on the oil?

Salt is heavier than water, so when you pour salt on the oil, it sinks to the bottom of the mixture, carrying a blob of oil with it. In the water, the salt starts to dissolve. As it dissolves, the salt releases the oil, which floats back up to the top of the water.

This looks like a Lava Lamp. How does a Lava Lamp work?



Like your oil and water, the "lava" in a Lava Lamp doesn't mix with the liquid that surrounds it. When it's cool, the "lava" is a little bit denser than the liquid surrounding it. When the "lava" rests on the bottom of the Lava Lamp, the light bulb in the lamp warms it up. As it warms up, the "lava" expands a little. When it expands, the "lava" stays the same weight but it takes up more space-so it's less dense. When it's warm enough, the "lava" is less dense than the surrounding liquid, and so it rises up to the top to float. At the top of the lamp, it cools down, becomes more dense, and sinks once again. This cycle repeats over and over as the "lava" warms up and rises, then cools down and sinks.

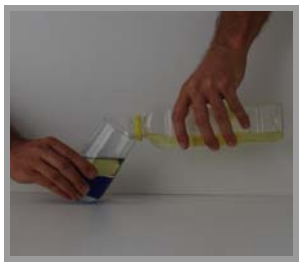
Where did this experiment come from, anyway?
Exploratorium Teacher-in-Residence Eric Muller created this activity while playing with his food in a Chinese restaurant.

FOR SOMETHING CLOSER TO A REAL LAVA LAMP:
Use mineral oil as the lava. Use 90% isopropyl alcohol (which most drugstores can easily order) (our store had 91%, which in theory should work just as well) and 70% isopropyl alcohol (grocery-store rubbing alcohol) for the other ingredient. In 90% alcohol the mineral oil will sink to the bottom; slowly add the 70% alcohol (gently mixing all the while; take your time) until the oil seems lighter and is about to "jump" off the bottom. Use the two alcohols to adjust the responsiveness of the "lava." More of the 70% alcohol is needed than the 90(1)%. So, plan ahead and leave enough room in your container for all the 70% which you will be adding. This mixture is placed in a closed container (the "lava lamp shape" is not required, although something fairly tall is good) and situated over a 40-watt bulb. If the "lava" tends to collect at the top, try putting a dimmer on the bulb, or a fan at the top of the container. To dye the liquid around it, use food coloring.

Teacher's notes

How to make a DIY Lava Lamp

1. Quarter fill a tall glass with coloured water – alternatively, use clear water at this stage and add a few drops of food colour after the oil is added.



2. Add oil to the glass until it is nearly full. If adding the drop of food colour now, it will sink through the oil without dissolving. It may take up to a minute for the drop to burst through the oil/water interface.

3. Add a soluble aspirin (or any other soluble tablet) and observe what happens.

4. The aspirin does not begin to dissolve until it breaks through and into the water.

5. The bubbles of carbon dioxide in the water make buoyant blobs which float in vegetable oil. When the blobs reach the surface, the bubbles pop so the blobs of water become less buoyant and sink again.

6. After removing the top layer, use a turkey baster to return the remaining oil to the bottle for re-use.