

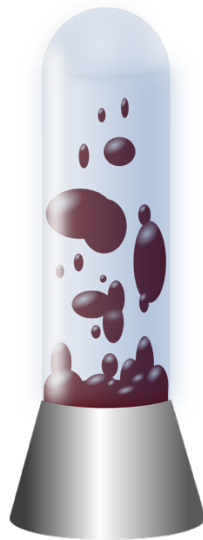
Science: LAVA Lamp!

Ages: 5 - 13

Hello everyone. This is Bill from the Okanagan Regional Library System. Welcome to the fun and inventive world of making STEAM projects in your own home.

Even though we can't be together right now, we can still learn how to make exciting projects each week!

LAVA Lamp



You can make your own LAVA Lamp.

At the heart of this activity is a chemical reaction between two substances: one called an acid (you will use vinegar) and one called a base (in this case, baking soda). The reaction produces amazing bubbles that rise through a tower of oil and then fall back down. So that the effect is even more impressive, you will also use an indicator, a colour-changing solution that turns red in acids and blue-green in bases, using some red cabbage.

The first thing you will need to do is to make the pH indicator. This involves soaking pieces of red cabbage in warm water. Once you have done this, you will add vinegar, which is an acid. You will then carry out the reaction in a vase or tall glass, which makes it easy to watch the colourful bubbles rise and fall. When you are finished, put the used oil back in its bottle, to be disposed in the garbage.

Materials Needed:

- Measuring Cup
- ½ red cabbage
- Large Bowl
- Small Bowl
- Spoon
- Scissors
- Baking Soda
- Distilled Vinegar
- Vegetable Oil
- Vase or Tall Glass
- Sieve



Time: 30 minutes plus time for the cabbage to soak.

Steps:

1. Half-fill the small bowl with warm water. Cut thin strips off the red cabbage, letting them fall into the water. Let stand for 10 minutes until the water turns a deep purple.



2. Pour the mixture through the sieve into the large bowl. Put the remains of the cabbage leaves into a recycling bin or the garbage.



3. Pour 50 ml of the purple solution into the measuring cup. This solution is your pH indicator.



4. Now add 50 ml of vinegar to your pH indicator. Don't take your eyes off the measuring cup – the solution will turn bright pink almost immediately! It turns pink because of the vinegar's acidity.



5. Spoon baking soda into the vase or tall glass. Add enough to cover its base.



6. Pour the oil over the baking soda. You will need enough oil to fill the vase about two-thirds full. Pour the oil gently so it does not stir up the baking soda.



7. Slowly pour the pink vinegar into the vase. As soon as the vinegar meets the baking soda, you will see red bubbles rise through the oil. Watch what happens over the next few minutes. As the reaction continues, the bubbles will change colour as the acidity of the liquid inside of them changes.



The Science behind your LAVA Lamp

The vinegar solution is acidic. It is also denser than the oil, so it sinks when you pour it into the vase. The acid reacts with the baking soda, producing bubbles of carbon dioxide gas (mixed with vinegar solution), which are less dense than the oil and rise up. At the surface, the bubbles burst and any vinegar and any vinegar solution inside them drops back down. The purple pigment from the red cabbage is an indicator – a chemical that changes colour depending on how acidic a solution is. At first it is pink, but it turns blue-green as the acid is used up in the reaction.

Real World Science – Baking Cup Cakes



You may have used baking powder to make cupcakes. Baking powder is baking soda mixed with a powdered acid. When it is added to a cupcake mixture, it gets wet, and the chemicals dissolve and begin to react. Heat speeds up the reaction, producing large bubbles of carbon dioxide that make the cupcakes rise as the bake.

STEAM

This activity includes everything you need for a comprehensive STEAM project.

Science: Understanding how acids and bases react with each other.

Technology: Understanding how acids and bases are used in real world situations.

Engineering and Art: Constructing and completing the experiment.

Math: Measuring the quantities needed to create your LAVA Lamp.