to become a visible crystalline solid. Chemists refer to this as a crystal "falling out of" the solution. If you left these crystals in the solution, they'd continue to grow, but they wouldn't get very big because they'd all be competing for the remaining cupric sulfate molecules in the solution.

Experiment #18 – Rochelle Salt

Make lots of tiny, rectangular Rochelle salt crystals from a simply made chemical solution.

YOU WILL NEED: 600 ml beaker, 250 ml beaker, alcohol lamp and stand, glass stir rod, funnel, spatula, potassium bitartrate, sodium carbonate, filter paper, and ***alcohol fuel***

1. Fill the 600 ml beaker to the first line (~25 ml) with water. Add 10 heaping scoops of potassium bitartrate one at a time, and stir.
2. Using the alcohol lamp, heat until it boils, stirring constantly.
3. Use a hot pad and adult's help to remove the beaker from heat and turn off the lamp.
4. Add heaping scoops of sodium carbonate, stirring in between. The solution will fizz. Repeat until no more bubbles form upon addition of sodium carbonate.
5. With a hot pad and an adult's help, pour the 600 ml beaker's contents into the 250 ml beaker. Use a filter-paper-lined funnel.
6. Place it in the refrigerator, uncovered. Within a few hours, crystalline Rochelle salt (potassium sodium tartrate) will have begun to form. Leave it overnight.
7. The next day, carefully pour off the remaining solution and use the spatula to transfer the Rochelle salt onto a filter paper to dry so you can examine it.

A crystal is a hard, solid substance made of molecules that bond together in specific patterns to form a shape with straight edges and flat surfaces. From the last experiment, you know not all crystals have the same shape or size. The site where a crystal begins to grow, called its nucleation site, determines its size: fewer nucleation sites mean larger crystals, and many nucleation sites produce smaller crystals. Here, you made the Rochelle salt crystals, the potassium sodium tartrate that precipitated out from your saturated solution.

Quick Crystals — Stir heaping spoonfuls of Epsom salt (magnesium sulfate) into a beaker with 100 ml hot tap until no more salt will dissolves. Add 3+ drops of food coloring, and put the beaker in the refrigerator. In a few hours, you'll have a beaker full of tiny, thin crystals!

PHYSICAL REACTIONS

Part of the fun of learning about chemistry is seeing that ordinary substances, such as water or soda, can exhibit some fascinating changes when you add other things to them! These visible reactions are not changes of state (from gas to liquid, or liquid to solid), but are physical changes, meaning a change in appearance.

Experiment #19 – Liquid Lava

You can make a physical reaction very similar to a lava lamp! This experiment uses simple chemicals, but shows an impressive change.

YOU WILL NEED*:* 250 ml flask, 250 ml beaker, Alka-Seltzer tablet, food coloring, ***vegetable oil***, and water

1. Fill the flask to the 200 ml line with vegetable oil.
2. In a 250 ml beaker, stir several drops of food coloring into approximately 100 ml filtered water. Fill the rest of the flask with the colored water, adding about 50 ml. The water will slowly sink down to the bottom of the flask.
3. Break an Alka-Seltzer tablet into a few small pieces and drop them in the flask one at a time.
4. Watch your lava lamp erupt into activity! As the reaction slows down, you can add more Alka-Seltzer pieces.

Remember that oil and water have different densities? Oil is also a non-polar liquid while water is a polar one. *Polarity* refers to the way molecules connect with each other – what kinds of molecular bonds they have. Polar molecules only bond with other polar molecules. This is why oil doesn't mix with water. Real lava lamps use a polar and non-polar liquid just like this one did. However, the densities of the liquids are much closer together than oil and water. The denser liquid sinks to the bottom, but the lava lamp light heats it up until it expands and becomes less dense, causing it to rise. As it gets farther from the light, it cools down, sinks, and starts over.

Instead of using a light, in our homemade lava lamp we used Alka-Seltzer, which reacts with the water to produce carbon dioxide gas bubbles. These stick to the water droplets. The water/gas combo is less dense than the oil, so it rises to the top of the flask. At the top, the gas bubbles pop and escape into the air, allowing the dense water to sink back to the bottom again. When enough carbon dioxide gas escaped, the reaction slowed.