What's Up With Fall Leaves?

Simple Supplies:

- Leaves
- Small Glass Jar
- Aluminum Foil
- Rubbing Alcohol
- Paper Coffee Filter
- Shallow Pan
- Hot Tap Water
- Plastic Knife or Spoon
- 1-inch Shallow Tray
- Tape

*Tip – A large baby food jar will work well for this activity and you can also use plastic wrap instead of aluminum foil to make the lid for the jar. **Safety Note:** Rubbing alcohol can be harmful if mishandled or misused. Use in a well-ventilated area, and avoid contact with skin.

What's up with the colorful Fall leaves:

Of all the natural processes around us, the annual changing of the leaves from green to different shades of yellow, orange, and red is perhaps the most beautiful. But behind this show of color, there are important scientific processes at work.

How To:

1. Have your child collect 2-3 large leaves from the same type of tree.
2. You and your child should tear or chop the leaves into very small pieces and put them into your jars.
3. Add enough rubbing alcohol to the jar to cover the leaves.
4. Using a plastic knife or spoon, carefully chop and grind the leaves in the alcohol.
5. Have your child cover the jar very loosely with a lid, aluminum foil or plastic wrap.
6. Place the jar carefully into a shallow tray containing 1 inch of hot tap water.
7. Keep the jar in the water for at least 30 minutes (longer if needed) until the alcohol has become colored (the darker the better).
8. Gently twirl the jar about every 5 minutes and replace the hot water if it cools.
9. Have your child cut a long thin strip of the coffee filter paper.
10. Remove the jar from the water and uncover it.
11. Then place a strip of filter paper into the jar so that one end is in the alcohol. Bend the other end over the top of the jar and secure it with tape.
12. Watch the slow process. The alcohol will travel up the coffee filter strip, bringing the colors with it. After 30 to 90 minutes, the colors will travel different distances up the filter strip as the alcohol evaporates. Your child should be able to see different shades of green, and possibly some yellow, orange, or red, depending on the type of leaf.

What Happened:

Chlorophyll is a green compound that hides or overpowers the other colored *pigments* present in leaves. In the Fall (Autumn), the chlorophyll begins to break down, allowing the other pigments to be seen. The mix of pigments in a leaf may be separated into bands of color by the technique of paper *chromatography*. Chromatography involves the separation of mixtures into individual components, which you just did using alcohol and energy (heat). Then, by "*absorption*" and "*capillarity*," separation can take place! The paper holds the substances using absorption, while capillarity pulls the substances up the paper at different rates. Pigments are separated on the paper and show up as colored streaks or bands. Here in Florida, due to our tropical climate, we have a lot of trees that stay green year-round in nature, like palm, and pine trees for example. But give them a try and see if you can make them change with this project.

Vocabulary:

- Chlorophyll – the green coloring matter found mainly in the chloroplasts of plants that absorbs energy from sunlight to produce carbohydrates from carbon dioxide and water during photosynthesis.
- Pigments – anything that is used to or serves to provide color.
- Chromatography – a method using mixed substances that depends on the speed at which they move through special media, or chemical substances. It consists of a stationary phase (a solid) and a mobile phase (a liquid or a gas).
- Absorption – a condition in which something takes in another substance. It is a physical or chemical phenomenon or process, in which atoms, molecules, or ions enter in the inner part of a gas, liquid, or solid material.
- Capillarity – the name of the process when liquids, like water, move up through a solid, like a hollow tube or spongy material.

More Fun:

- Repeat experiment using different types of leaves and compare the results.
- Repeat experiment using different types of papers and compare the results.