Weather Flowers

Can you tell if the air around you is humid or dry? Although humidity cannot be seen, it has important effects on the weather. This moisture-detecting flower will display the color pink, purple, or blue based on the humidity in the air, giving you insight into the weather before you step outside!

TEKS:

2.5B Compare changes in materials caused by heating and cooling.

2.8B Identify the importance of weather and seasonal information to make choices in clothing, activities, and transportation.

3.5D Explore and recognize that a mixture is created when two materials are combined, such as gravel and sand, or metal and plastic paper clips.

4.5B Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.

5.5D(ss) Identify changes that can occur in the physical properties of the ingredients of solutions, such as dissolving salt in water or adding lemon juice to water.
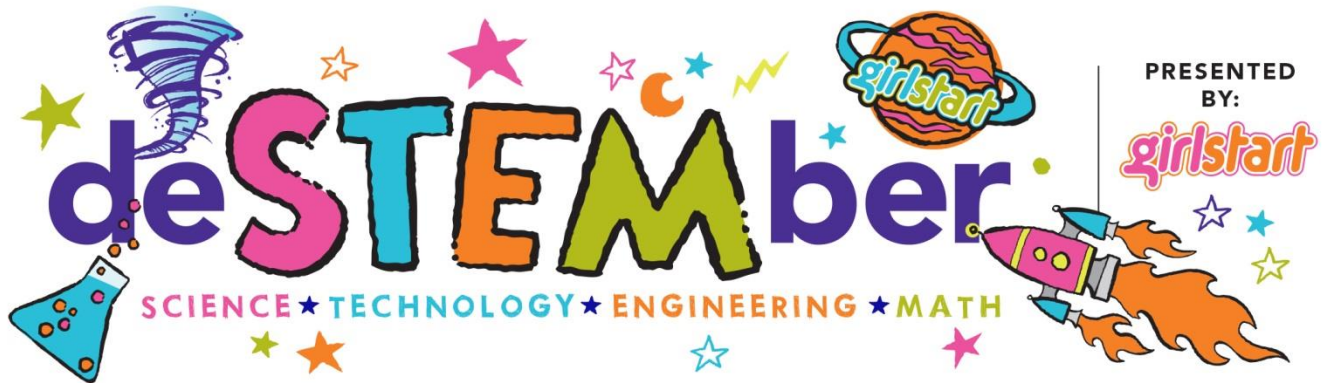
Materials:

- Gloves
- Safety goggles
- Shallow aluminum foil pan
- Water in a spray bottle
- Coffee filters (one per flower)
- 10% (m/v) cobalt (II) chloride solution. This can be found at: http://www.hometrainingtools.com/cobalt-ii-chloride-15-g/p/CH-COCL2/
- Pipe cleaners (one per flower)
- Hair dryer

How To:

Preparation:

Note: Adults can demonstrate this portion of the procedure or prepare filters prior to the lab.

1. Cut the filter paper into a shape resembling flower petals. Put on safety goggles and gloves.
2. Pour a small amount of cobalt chloride solution into the shallow pan. The solution should be 10% cobalt chloride crystals and 90% water.
3. Dip the cutout into the solution of 10% cobalt chloride. Allow the dipped paper to dry by hanging it or laying it flat.
4. Continue using gloves when handling the paper until it is completely dry. Use a hair dryer to make sure that the filter paper shape is completely dry.

CAUTION: Cobalt chloride could be harmful if swallowed. Cobalt chloride could also cause skin irritation. If skin contact occurs, wash thoroughly. Once the humidity monitors are completely dry, it is safe to handle them.

Procedure:

1. Spray a small amount of water on the dried paper to demonstrate the blue to pink color change that would occur in high humidity conditions.
2. Use a hair dryer to completely dry the filter paper, watching the color change as the paper dries.
3. To form a flower, fold the dried filter in half twice and wrap a pipe cleaner around the point of the folded filter.
4. Open the folded filter to look like a flower.
5. You can now use the color change in your flower to take note of current humidity conditions wherever you are!

Why Does It Work?

The solution used to soak the coffee filter is cobalt chloride. When this blue colored solution reacts with water, it forms cobalt chloride hexahydrate ($CoCl_2 \bullet H_2O$); the product of this chemical reaction is pink. For low humidity conditions the filter paper should appear blue, for moderate humidity the paper should appear purple, and for high humidity it should change to pink.
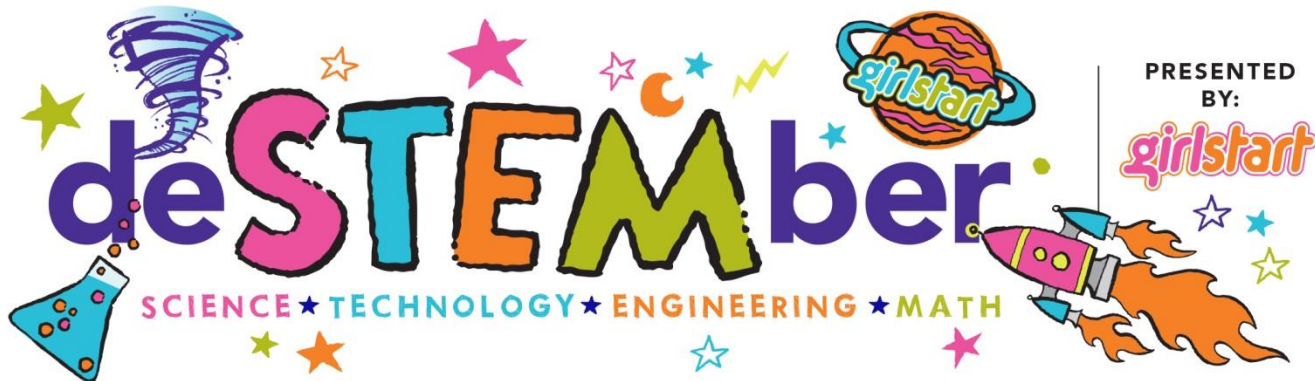
Career Connection:

Meteorologists study the Earth's atmosphere by observing temperature, air pressure, water vapor, and their interactions and changes over time. They use simulations to help them predict the weather and to understand weather patterns so they can piece together climatic schemes, or focus on more complex weather such as hurricanes, tornados, etc. Meteorologists need an in depth knowledge of physics, geology, chemistry, and other sub-disciplines of atmospheric sciences including climatology, hydrology, and even oceanography. These scientists are important to the fields of energy production, transportation, agriculture, and more.

Additional Resources:

- Cobalt Chloride: Colorful Moisture Detector: http://chlorine.americanchemistry.com/Science-Center/Chlorine-Compound-of-the-Month-Library/Cobalt-Chloride-Colorful-Moisture-Detector
- Teaching Chemistry With Toys: http://www.amazon.com/Teaching-Chemistry-TOYS-Jerry-Sarquis/dp/1883822297/ref=lh_ni_t?ie=UTF8&psc=1&smid=A3BFX54YL3T3L3