

STAR WARS LIGHTSABER

KYBER CRYSTALS

"The strongest stars have hearts of kyber." Chirrut Imwe - Rogue One

Some of the most memorable scenes from the Star Wars movies are the awesome lightsaber battles. The brilliance of the colored light and power of the force comes from a single source, a kyber crystal. It is considered a rite of passage for a young Jedi to find a kyber crystal and use it to build their first lightsaber. During their search, Jedi let the Force guide their selection to the perfect crystal. The kyber crystal is white when it is first found. Once the crystal connects to a Jedi, it will change to a color. The crystal will change colors based on the power of the force in the Jedi. Some of the more recognizable lightsabers colors are the blue blade of Obe-Wan Kenobi, the green blade of Yoda, the red blade of Darth Vader, and the yellow blade of Rey Skywalker.

In this activity the force will guide you to make kyber crystals. May the force be with you as you as you build your own lightsaber.

GRADE LEVELS: K-6

VOCABULARY

Crystal- a solid material with atoms and molecules that are arranged in a consistent repeating pattern, creating one of seven geometrical shapes.

Saturated solution- used in chemistry to define a solution in which no more solute can be dissolved in the solvent.

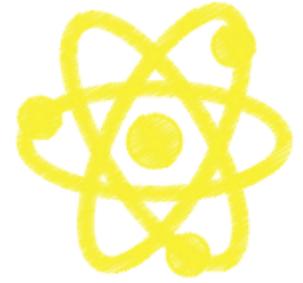
Solvent- the solvent dissolves other materials(water).

Solution- two substances that are evenly mixed. One of them is called the solute and the other is the solvent.

Solute- the substance to be dissolved (Borax).

MATERIALS

- Wide-mouth jar
- Pipe cleaners (color of your lightsaber)
- String
- Scissors
- A pencil
- Water
- 1-cup measuring cup
- Tablespoon
- Borax (found in the laundry aisle at the grocery store)
- Food coloring (optional)



PROCEDURE

1. Use the force to decide what color you want your lightsaber to be. Then pick the color of pipe cleaner to match your choice. Fold the pipe cleaner in half and squeeze the pipe cleaner together so that it looks like one piece. Make sure that the pipe cleaner fits inside your jar and is not touching the bottom of the jar. If it does, you will need to trim off the bottom of the pipe cleaner with scissors.
2. Tie a piece of string to one end of the pipe cleaner. Tie the other end of the string around the middle of a pencil.
3. Hang the lightsaber in the jar with the pencil resting across the mouth of the jar. Make sure that the pipe cleaner hangs without touching any part of the jar. Take the pencil off the jar and set it aside.
4. Use a 1-cup measuring cup and fill your jar about 3/4 full of water (solvent). Count each cup as it is poured into the jar (will be needed in Step 6)
5. Microwave the jar of water for 3-5 minutes or until it begins to boil. Have an adult carefully take the jar out using hot pads (the jar will be very hot!) and set it on a heat-safe surface.
6. For every cup of water you put in the jar, measure three tablespoons of Borax and add it to the water. Stir the Borax solution with a spoon until as much of it dissolves as is possible. If you don't see any tiny pieces of Borax floating around the jar, add another tablespoon and stir. This will make a saturated solution.
7. Food coloring can also be added to the water solution. Adding food coloring that is the same color as your pipe cleaner will make your crystals really stand out.
8. Grab the pencil and once again place it over the mouth of the jar, making sure the string with the pipe cleaner is inside the jar. Adjust the string if needed to make sure the pipe cleaner lightsaber is completely covered in the water/Borax solution.
9. Let it sit overnight, without moving the pencil or the pipe cleaner.
10. The next morning, gently remove your pipe cleaner lightsaber. There should be tiny crystals stuck to the pipe cleaner. To grow more crystals, keep the pipe cleaner in the solution longer.

Unlike a true kyber crystal, which is close to indestructible and can survive high levels of trauma, this crystal is fragile and needs to be handled carefully.

THE SCIENCE BEHIND IT

In this activity a saturated solution of Borax was made. Borax is a chemical that forms crystals when the conditions are right. By mixing the hot water, letting it cool, and by having something for the Borax (solute) molecules to attach to (the pipe cleaner), this gave the solution the right conditions to grow crystals. Once the crystals started to grow on the lightsaber, more and more crystals formed around them.

In nature, crystals often form when liquids cool and start to harden. Molecules in the liquid gather to become stable. Crystals do this in a uniform and repeating pattern. Some of our favorite crystals like diamonds, rubies, and emeralds form this way. Another way crystals can form is when water evaporates from a mixture. Salt crystals form as salt water evaporates. Ice crystals that make up snowflakes are not quite like these Borax crystals, but they do look similar and are both pretty and sparkle when light shines on them. Real ice crystals are made only of water. The difference is that they are formed when water vapor in clouds freezes and falls to the ground as snowflakes! Frost is another form of ice crystal that you might see on your windows on a cold morning.

EXTENSIONS

- *To make your lightsaber glow in the dark, paint the pipe cleaner shape with glow-in-the-dark paint in step one and let it dry completely before continuing*
- *Research the different types and uses of crystals*
- *Try using different solutes like alum and sugar and see what solute produces the best crystals*

RESOURCES

- <https://learning-center.homesciencetools.com/article/crystal-growing-science/>
- <https://examples.yourdictionary.com/examples-of-saturated-solution.html>
- <https://www.ducksters.com/science/crystals.php>

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