Ecotarium
museum of science and nature

Wild About Winter: At-Home Activities

Grow Your Own Snowflakes

Supplies:

- 3 or more pipe cleaners (each about 6" long)
- Glass jar with wide mouth
- Scissors
- String
- 1 ½ cups borax powder
- Water
- Popsicle stick
- A stove, cooking pot (*This is a good activity to do with a grown-up)

Procedure:

Create a six-pointed snowflake out of the pipe cleaners by wrapping the middle of one around the middle of the other. Do the same with the third, wrapping around the spot where the two others meet, and space them out evenly.

Trim the ends of the pipe cleaners to fit inside your jar without touching the sides, and use the bits you trim off to wrap around the ends to look like angular dendrites. Tie a piece of string to one end.

Combine 3 cups of water and 1 ½ cups of borax powder in a pot. Turn the heat up to high and boil the mixture until it turns clear, stirring frequently.

When the mixture turns clear, turn the stove off and let it cool a little (boiling water may break the glass). Then pour the liquid into the jar.

Wrap the free end of the string (with the snowflake at the other end) around a popsicle stick, and submerge the snowflake entirely in the liquid, so the popsicle stick rests over the top of the jar. Leave the jar sit undisturbed for several hours.

Make a prediction: What do you think will happen to the snowflake?

In as little as a couple hours, you should start to see crystals form on the snowflake. Wait a full 24 hours, carefully remove the snowflake from the jar, and let it dry off.

Now you have a beautiful science ornament to hang in the window! Look at it with a magnifying glass. What do you notice? What shape are the crystals?

What's Happening?

Borax (sodium borate) is a white powder that dissolves in water, and forms crystals under certain conditions. A crystal is just a solid substance that has a regular, symmetrical pattern. Can you think of a famous winter substance that forms when water freezes into crystals? You guessed it: Snow!

Crystals form from the borax solution this way: When you pour a LOT of borax into boiling water, the water molecules are zipping around so fast, they sort of make room for all of the borax particles, and the borax dissolves. This is called supersaturation. BUT as the water cools, it loses heat energy, the water molecules move more slowly, and there's less room or borax. So where does the borax go?

It can't escape the jar, so the borax nucleates (gathers together) around whatever's nearby. In this case, it's the fine fibers of the pipe cleaner. And the borax makes flat, angular shapes because of its own hexagonal (six-sided) chemical structure. The molecules are attracted to each other, and build out from the pipe cleaner, creating borax crystals.

We have this process to thank for snow, too! When water vapor reaches 32°F, and down from the clouds, water molecules nucleate around pieces of dust in the air. They form elaborate hexagonal shapes because of the structure of the molecule H2O. And when they fall to Earth, we get to smoosh them into snowballs!