October 30, 2018 Chemistry Club

Soap Crystals

Materials:

1. Pipe cleaner
2. 3 tbsp Borax
3. 1 cup water
4. Hot plate
5. String
6. Pencil
7. Beaker
8. Stir rod

Procedure:

1. Make a design out of pipe cleaners to crystalize in suspension
2. Tie your design to a piece of string and tie the other end of the string to a pencil horizontally, so that the pipe cleaner is hanging from the pencil by the string. Cut off excess string
3. Heat up a cup of water until it's just about boiling
4. Add 1 tbsp of borax to the boiling water and stir. Gradually add the other 2 tbsp
5. Carefully remove the suspension in borax and water from the hot plate
6. Cautiously dip the pipe cleaner into the borax suspension. Rest the pencil on the top of the beaker so that the pipe cleaner dangles into the borax suspension. Be sure to have the pipe cleaner completely suspended in the solution, so that it doesn't touch any of the beaker walls
7. Leave the beaker with the pipe cleaner suspended in it unmoved overnight
8. Remove the crystalized design from the borax suspension and let them dry on a paper towel

The Science behind it:

When you mixed the borax and water, you created a suspension of borax. A suspension is a mixture that contains solid particles large enough to make the liquid appear cloudy or murky. By mixing the borax into hot water, instead of room temperature or cold water, the borax can stay suspended much longer. Very hot water can hold much more dissolved borax than cold water. Hot water molecules are moving very fast and are spread way out which makes space available for more borax to dissolve into it. As the mixture cools, the water molecules slow down and move closer together. That means there's less room for the dissolved borax and it begins to fall out of the water.

As the borax settles out out of the cooling suspension due to gravity, it bonds with other borax on nucleation sites (bumps, tiny cracks, impurities, etc. in the container) and begins to form seeds for further crystallization. Crystals come together in specific, repeated patterns due to the shape

Lab by President Karla Ravin

of the molecules forming them. You'll see this crystallization on the bottom and sides of the container, on the string hanging from the pencil, and on the pipe cleaner arms of the snowflake. The borax continues to fall and crystalize on top of the snowflake and on top of other borax crystals until you pull it out of the water the next morning.

Questions:

1. What is a suspension?

2. What kind of suspension is made (saturated, supersaturated, unsaturated)? How do you know?

3. Why is it important to let the crystalized pipe cleaner dry?

4. What would happen if you add food coloring?

5. If you use sugar instead of borax, what will form?

More info:

- https://www.instructables.com/id/How-to-Grow-Borax-Crystals/
- https://www.stevespanglerscience.com/lab/experiments/magic-crystal-snowflake/
- https://www.livescience.com/41636-borax-crystal-snowflakes.html