November 20, 2018 Chemistry Club

Holiday Soaps

Materials:

1. 12 mL (1 tbsp) Fragrance oil or essential oil
2. 10 drops Soap-safe dye
3. Hot plate
4. 1 lb Glycerin and soap base
5. Beaker
6. Saran wrap
7. Stir rod
8. Moldings (~9)
9. Rubbing alcohol (if necessary)
10. Non-stick cooking spray

Procedure:

1. Cut and melt soap base on the hot plate while stirring and put Saran wrap over the top so that the soap doesn't dry out (about 50ºC)
2. Once melted, stop the heat.
3. Slowly add fragrance/essential oil to the melted soap while gently stirring (12 mL per pound of soap)
4. Add about 10 drops of soap-safe dye per pound of soap and gently stir (you can experiment with dyes)
5. If you do get bubbles, a light spritz of rubbing alcohol from a spray bottle gets rid of them.
6. Spray molds with non-stick cooking spray. Pour the melted mixture into the molds.
7. Carefully move the mold to a safe place and cover with Saran wrap.
8. The soap should be hard enough to unmold in a few hours. You can speed this up by putting the mold in the refrigerator (1hr), *but don't put it into the freezer*.
9. Pop the soap out of the mold

The Science behind it:

Glycerin is a natural byproduct of the saponification process. It's one of the reasons handmade soap feels so amazing – it draws moisture to the skin and keeps it hydrated.

Soap lessens the surface tension of the water so that it more readily wets what needs to be cleaned rather than simply balling up on the surface.

Soap molecules are like a bar magnet — but instead of north on one side and south on the other, the molecules are hydrophilic (water-attracting) on one side and hydrophobic (water-repelling) on the other.

Chemists say that “like dissolves like”. This means that polar molecules can dissolve other polar molecules, but non-polar molecules require other non-polar molecules to dissolve them. Soap is fairly unique in that it can dissolve in both non-polar and polar solvents. Soap contains both polar and non-polar properties, thanks to its formula.

Surface tension is what causes water to form droplets or beads on surfaces. This phenomenon slows the process of water wetting many surfaces and can also slow the cleaning process. The bond that each water molecule makes with other water molecules creates the surface tension, in which all molecules are pulled into the water droplet. Soap is a surface active agent, or surfactant, help to reduce the surface tension of the water so it can spread and wet the surface and speed up the cleaning process. Some people describe this as soap making "water wetter."

Soap molecules are long and thin with one end being hydrophilic and the other hydrophobic. The hydrophobic ends of the molecules are attracted to dirt and oil. The dirt and oil particles are surrounded by many soap molecules and being held onto by the hydrophobic ends while the hydrophilic ends stick outward waiting to be rinsed away by water.

These two processes work together to clean surfaces. Soap may also contain other ingredients, which are added to increase the effectiveness of the soap or to adjust the pH (to either control or modify the pH to make it safer and gentler).

Questions:

1. What is surface tension?

2. What does hydrophilic and hydrophobic mean?

3. What are characteristics of acids and bases?

4. Is soap an acid or a base?

More info:

- https://www.thesprucecrafts.com/how-to-make-melt-and-pour-soap-517100
- https://www.wikihow.com/Make-%27Melt-and-Pour%27-Soap
- https://www.soapqueen.com/bath-and-body-tutorials/melt-and-pour-soap/free-beginners-guide-to-soapmaking-melt-and-pour/
- https://www.candlescience.com/learning/melt-and-pour-soap-making-for-beginners
- https://www.livescience.com/57044-science-of-soap.html
- https://sciencetrends.com/science-behind-soap-works-make-clean/
- https://www.ehow.com/how_4853532_soap-liquid-glycerin.html