

Lab: Making Snow Globes

Snow is made from crystals of benzoic acid, (a.k.a.: benzene carboxylic acid, phenyl carboxylic acid), is an aromatic carboxylic acid, a colourless crystalline solid. Benzoic acid, $C_6H_5COOH_{(s)}$, is dissolved at a higher temperature to increase the solubility. Benzoic acid solution, $C_6H_5COOH_{(aq)}$ is then cooled to room temperature causing it to precipitate out as the solid benzoic acid crystals.

If the benzoic acid solution is allowed to cool slowly, then the benzoic acid will form snow-like flakes.

(Melting point of benzoic acid: $122.4\text{ }^{\circ}\text{C}$, solubility = $0.29\text{ g}/100\text{ g}$ water at $20\text{ }^{\circ}\text{C}$, density = 1.3 g cm^{-3})

Safety

Benzoic acid is used as a preservative in food, so it is pretty safe. However, pure benzoic acid can be very irritating to skin and mucous membranes.

Materials & Apparatus

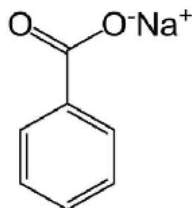
~ 1.00 g benzoic acid, baby food jar, beaker, stirring rod, any decoration to glue to the lid of the jar, hot plate, hot glue gun.

Procedure

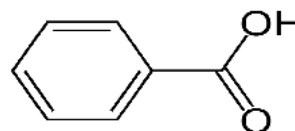
1. Place 75 mL of water into a small beaker, and add ~ 1.00 g benzoic acid, just heat to dissolve the benzoic acid.
2. Use a hot glue gun to glue the decoration object to the lid of the jar. (Note: the snow globe will be an upside down jar.) Use tweezers or forceps to position the decoration object in the glue.
3. While the glue is cooling, observe the benzoic acid solution. As it approaches room temperature, the benzoic acid will precipitate out of solution to form "snow". The rate of cooling affects the 'snow'. Slow cooling produces fine snow flake-like crystals, whilst quick cooling produces something more like snowballs than snowflakes.
4. Once the solution cools to room temperature, pour the cooled benzoic acid solution into the glass jar.
5. Fill the jar as full as possible with the solution. Any air pockets will cause the benzoic acid to form clumps.
6. Place the lid on the jar and seal the jar with hot glue or electrical tape.
7. Gently shake the jar to see the pretty effect of the snow.

Benzoic acid

A preservative normally used as the sodium, potassium, or calcium salts and their derivatives, especially in acid foods such as pickles and sauces. It occurs naturally in a number of fruits, including cranberries, prunes, greengages, and cloudberry, and in cinnamon. Cloudberry contains so much benzoic acid that they can be stored for long periods of time without bacterial or fungal spoilage.



Sodium benzoate



Benzoic acid