

## LAB: SNOWGLOBES

**SPECIAL SAFETY NOTE:** Although benzoic acid is not a particularly harmful chemical, it does serve as a food preservative and will irritate both eyes and skin if contact occurs. **Do Not Play** with the chemical solution. After the snow globe is made, leave the jar closed at all times. Do not let small children play with it.

Students: Please read the following information given below, and then come to class on your lab day with the following already prepared in your notebooks:



### 1) Date, 2) Partner, 3) Title, 4) Purpose, 5) Materials, 6) Safety, and 7) Procedures/Observations

The last page need to be printed out. This page will be turned in. The questions will be due one week after performing the lab in class (your next lab class).

In this lab, you will learn how some solutes that are only partially soluble in water can be forced to fully dissolve with heat. Certain substances, by the nature of their bonding, are not particularly soluble in water. However, sometimes, under certain circumstances, they can be forced to dissolve for a brief period of time when the temperature of the water is increased.

When a solvent has dissolved as much solute as it possibly can, and no more will dissolve no matter how much you stir it, the solution is said to be “saturated.” If you take a **saturated** solution, add more solute and heat it, the extra solute will dissolve. When you then cool the solution, which is **supersaturated**, the extra solute that dissolved with heat will once again precipitate out, or crystallize. The lab you are doing today is a beautiful application of that principle of solubility.

Prior to doing the lab, you should have brought in a **6 oz glass baby food jar** that has been cleaned and dried with the label removed AND a **small figurine** that can fit inside the jar. Your teacher must glue the figurine to the bottom of the jar with a waterproof glue and this will take at least a day to cure.

When lab day comes, obtain a hot plate and 600 ml beaker. Slowly heat about 300 ml of tap water on the hot plate (150 ml for each lab partner), but **DO NOT ALLOW IT TO BOIL!!** While the water is heating, obtain approximately 4 grams of benzoic acid (2g for each 150ml of water.) Study the shape of the benzoic acid crystals and sketch a sample in your observation section. Please put the cap back on, because the smell of benzoic acid is pretty bad. Place the benzoic acid into the heated water. You may need to turn up the heat and constantly stir the mixture until the benzoic acid completely dissolves and makes a solution (it may take 20 minutes or more for all of the crystals to dissolve). Record how long it took for all the crystals to dissolve completely. **Do not boil the solution.**

Remove the solution from the hot plate and allow it to begin cooling on the cooling square at your station. Beautiful crystals form when allowed to form **SLOWLY**. Be patient. While you are waiting for your solution to cool, return to your seat for the day’s lesson. Periodically check your benzoic acid solution and as it begins to cool, you will see beautiful snowy looking crystals appear. Study the shape of the crystals now and sketch a sample in your observation section. Allow the solution to completely cool to room temperature (If you don’t, the figurine usually falls off). After your solution is cool, gently stir the snow mixture a few times. Then quickly pour it into the baby food jar. **DO NOT fill the jar with the solution.** You may add a very small amount of glitter at this time for an additional sparkling effect. Next **use a graduated cylinder** to slowly add tap water to fill the jar almost to the brim. Dry the lid and jar if any water dripped or spilled on it. Have your teacher run a bead of glue or caulk along the inside of your lid at this time. You should not invert the snow globe until the glue has time to cure (about 1 day). You may now decorate the lid if you like with the craft supplies available.

**Remember to convert the procedural steps above into passive voice in the future tense when you do your pre-lab.**

Name \_\_\_\_\_

Date \_\_\_\_\_

Period \_\_\_\_\_

Lab Group # \_\_\_\_\_

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### Questions:

1. Describe crystal shape of Benzoic Acid before dissolving in water and sketch a sample of it.
2. How many minutes did it take for the Benzoic Acid to completely dissolve?
3. After how many minutes did crystals begin to reappear?
4. Describe the crystal shape of Benzoic Acid after dissolving in water and sketch a sample of it.
5. Write the chemical formula for Benzoic Acid and draw the structural formula for it. Is it ionic or covalent?
6. Why is the benzoic acid so resistant to dissolving in the water?
7. What is the most important reason for NOT allowing the water mixture to boil?