

# Snowflake Crystals

## 4<sup>th</sup> Grade

Kelly Denney, Justin Shearer, Mrs. Berridge, Mrs. Nolan, and Mrs. Skopin

### References:

- Borax Crystal Snowflake (Grow a snowflake in a jar)  
[www.feelfamily.com/activities/sno/boraxsnowflake.html](http://www.feelfamily.com/activities/sno/boraxsnowflake.html)
- Literature connection: Snowflake Bentley by Jacqueline Briggs Martin

### Benchmarks:

SLC/GLI #: PS-1

### Objectives:

The objective of this lesson is to integrate physical changes in science with literature, using a story based on the true life story of Wilson Bentley, a man who lived in the early 20<sup>th</sup> century and photographed snowflakes for a living. Because of the connection of this story with snowflakes, we will relate it to physical changes, both through snow flakes melting and also through the activity which makes “snowflakes” by growing borax crystals on pipe cleaners.

### Materials:

- String
- Wide mouth pint jar
- White pipe cleaners
- Blue food coloring (optional)
- Boiling water (with adult help)
- Borax (available at grocery stores in the laundry soap section, as 20 Mule Team Borax Laundry Booster – NOT Boraxo Soap)
- Pencil

### Initial Demonstration:

The students will have already read Snowflake Bentley so the initial demonstration should be a discussion that the main character was a real person, who really did photograph snowflakes. We'll show photos of some of his snowflakes using a projector; discuss how they're all different because of the way they form. We've done enough physical change lessons that the students should be able to tell you what physical changes snowflakes undergo. Also, you can bring math in by having the students describe mathematically what shape snowflakes are.

### Target Observations:

- Students should know the basic shape of snowflakes (hexagonal)

- Students should know that snowflakes undergo a physical change when they melt
- Students should understand that no two snowflakes are the same because of the way they are formed.

### **Procedure:**

- 1.) Cut a white pipe cleaner into 3 equal sections.
- 2.) Twist the sections together in the center so that you have a “six-sided” star shape. If your points are not even, trim the pipe-cleaner sections to the same length.
- 3.) Now attach string along the outer edges to form a snowflake pattern.
- 4.) Attach a piece of string to the top of one of the pipe cleaners and tie the other end to a pencil (This is to hang it from).
- 5.) Fill a wide-mouth jar with boiling water.
- 6.) Mix borax into the water one tablespoon at a time. Use 3 tablespoons of borax per cup of water.
- 7.) Stir until dissolved, (don’t worry if there is powder settling on the bottom of the jar).
- 8.) If you want you can add a little blue food coloring now to give the snowflake a bluish hue.
- 9.) Insert your pipe cleaner snowflake into the jar so that the pencil is resting on the lip of jar and the snowflake is freely suspended in the borax solution.
- 10.) Wait overnight and by morning the snowflake will be covered with shiny crystals.
- 11.) Hang in a window as a sun-catcher or use as a winter-time decoration.

### **Target Observations:**

- Students should notice the shape of their snowflake – it’s hexagonal
- Students should also notice the physical changes that are apparent in this activity.

### **Target Revised Model:**

- Students should come to conclusion that physical changes occur when you dissolve borax in water
- Students should also understand how crystals form – from the molecular make-up of materials such as borax, sugar, salt, etc.

### **Summary:**

This lesson was written to teach physical changes and also to incorporate literature into science through the book Snowflake Bentley. Students made their own snowflakes by growing borax crystals on pipe cleaners put into the shape of a snowflake.