BUBBLE & FIZZ

WEEK 7: SNOW, ICE CRYSTALS & ICE CREAM

EVER WONDER . . . WHAT SNOW AND ICE CREAM HAVE IN COMMON?

What we learned this week:

- What liquids and solids are.
- How liquids and solids can change "phases."
- That snow and ice cream both are solids formed from liquids through temperature change.

Today's Experiments

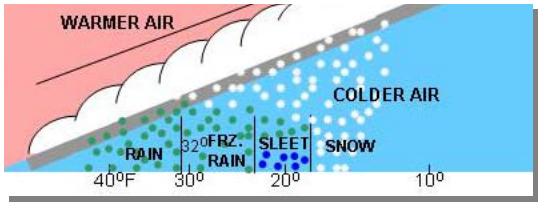
1. Make ice cream.
2. Make snowflake art.
3. Experiment with Insta-Snow.
4. Observe how salt affects freezing water.

Did you know?

- A solid is an object that is hard and holds its shape. A liquid is any object that can slosh and flow and take the shape of the container it is in. When you heat up a solid, like an ice cube, it melts and becomes a liquid. When you cool something down, like water, it eventually freezes into a solid. These are called phase changes – meaning, the substance changes from one form or "phase" to another. Liquid and solid are two phases of matter. We'll learn about a third phase – gas – another time.
- Changes in temperature affect whether something is a liquid or a solid. You can change solids like ice, butter and chocolate into liquids by heating them. You can change liquids like water, cream and juice into solids by cooling them. Liquids and solids can also be changed through absorption and evaporation, or by adding other chemicals.
- Water freezes at 32 degrees Fahrenheit (0 degrees Celsius). If a cloud gets cold enough, water droplets freeze around specs of dust in the air and form chains of ice crystals. These chains then grow into lacy, pointed stars that are so complex in design that no two snowflakes seem to look alike (though it is technically possible). Most snowflakes have six points and are about half an inch wide. But some can have many more points and be more than 3 inches wide!

- The size of a snowflake depends largely on air temperature. If the air temperature is well below freezing, "dry snow" occurs. This kind of snow is hard to clump together because it has very little liquid in it – it is mostly ice crystals. These snowflakes tend to be very small. The closer the air temperature is to the freezing point, the wetter the snow. Wet snow clumps together more easily and forms larger flakes. (This is the kind of snow that makes great snowballs!) By the way, if it seems like it's quieter outside after a fresh snowfall – it is. Soft, fluffy snow actually absorbs sound waves. But when snow is hard and crusty, the opposite happens – it bounces back sound waves, making sounds louder and clearer.
- Sometimes snowflakes melt before they reach the ground. This can cause freezing rain, sleet or hail. Freezing rain is snow that hits a layer of warm air on the way down and becomes rain, then

passes through a layer of cold air again. When the cooled raindrops strike frozen ground, they freeze too, causing ice. Sleet is raindrops or partially melted snow flakes that freeze into solid, clear, tiny ice pellets. Unlike freezing rain, sleet is a solid that bounces when it hits the ground. Sleet, like snow, is common in the winter. Hail is formed when ice pellets bounce around in the atmosphere, going in and out of warm and cold air, causing layers of ice to form. Sometimes so many layers form that the hail stone becomes the size of golf ball – or bigger! Hail is more common in the unstable, shifting hot/cold air of spring than during the winter.



- The creation of ice cream involves a lot of chemistry. Somehow, you have to get the fat and water in the cream to partially freeze and form a scoopable solid! We kept moving the ball to "churn" the cream, which causes the fats in the cream to stick together. (This is also how butter is formed.)

- We added rock salt to the ice surrounding the ice cream maker because salt lowers the freezing point of the ice, which in turn causes the cream to cool faster. While regular water freezes at a certain temperature, salt water needs to be much, much colder to freeze. That's why we put salt on icy sidewalks – and why oceans don't freeze unless the water is extremely cold, like areas near the North Pole or South Pole. That's the only place you will find iceburgs in the ocean.

Amazing Scientist

Wilson A. "Snowflake" Bentley. Snowflake Bentley lived in Vermont in the late 1800s. He spent 40 years studying snowflakes! He took over 5,000 pictures of snowflakes, and although he never found any two that were alike, he was able to develop a system for categorizing 80 different kinds of flakes, including those shaped in needles, hollow columns and capped columns. His work helped modern meteorologists better understand how snowflakes are formed. For example, the snowflakes formed at the top of clouds where the temperature is the coldest are different from those formed at the bottom, where it is warmer. Snowflake Bentley did all of his work with a camera, a magnifying glass and a piece of black felt mounted to a board, which he used to catch the snowflakes. This winter, you could do this too!

Curiosity @ Home

Cut out more snowflakes at home. Can you make two that are the same? Make more puffy paint by combining equal parts shaving cream and washable glue.

Word Scramble

Can you unscramble these words from today's class?

WFEKLAONSS

__ __ __ __ __ __ __ __ __ __

(water crystals that form in clouds during winter)

GEEFRINZ NTPOI

__ __ __ __ __ __ __ __ __ __ __ __ __ __

(when water turns from a liquid to a solid)

DIIUQL

__ __ __ __ __ __

(phase of matter that takes the shape of the container it is in)

DLISO

__ __ __ __ __

(phase of matter than remains the same shape despite its container)