



Dry Ice Root Beer & Sodas

Materials:

Dry Ice	Tall Clear Cups
Cooler	Dry Ice Straws
Hammer	Plastic Spoons
Thick Glove	Food Coloring
Distilled Water	Sugar
Edible Glitter	Measuring Cups & Spoons
Root Beer Extract	Powdered Drink Mix Packets

Vocabulary:

Dry Ice	Carbon Dioxide	Chemistry	Solid
Liquid	Gas	Melt	Sublimate
Bubble	Freeze	Temperature	Solution
Mixture	Carbonation	Molecules	

Dry Ice Root Beer Directions:

1. First, chill 1 gallon of distilled water. The colder it is, the more carbonation you will create.
2. Mix 1 pound of sugar or sweetener in with the water and refrigerate overnight.
3. Add the water to your large cooler and mix in 1 Tablespoon root beer concentrate.
4. Next, put in 1 pound of dry ice using tongs or gloves. DO NOT TOUCH THE DRY ICE.
5. Watch what happens! As the dry ice sublimates (turns from a solid to a gas) it adds bubbles to the root beer solution. If your container has a lid, you can rest it on top, but make sure some of the gas can easily escape.
6. You can scale up this recipe pretty easily, since it uses a 1:1:1:1 ratio. So, if you wanted to make 5 gallons of root beer, you would use 5 gallons of water, 5 pounds of sugar, 5 tablespoons of root beer concentrate and 5 pounds of dry ice. You can also experiment by adding other extracts, like vanilla, to give your root beer a unique flavor!



Dry Ice Soda Directions:

1. Fill a tall plastic cup $\frac{3}{4}$ full with distilled water.
2. Add a packet of flavoring of your choice.
3. Taste and adjust the recipe as needed.
4. Add food coloring, if you wish.
5. Add a nugget of dry ice, using gloves or tongs.
6. Allow the dry ice to full sublimate in your cup, carbonating the water.
7. When you are ready to drink, you can also add edible glitter if you would like and use a dry ice straw (the small compartment can hold dry ice and make your drink safely bubble).

The STEAM Behind the Experiment:

Dry ice is the solid form (frozen) of carbon dioxide. It is 109 degrees Fahrenheit below zero and can cause frost burn if not handled properly. It turns into a carbon dioxide gas instead of a liquid as it breaks down. Carbon Dioxide is the major gas in our planet's atmosphere. When dry ice sublimates, it turns directly into carbon dioxide gas and skips the liquid state.

When soda companies add carbon dioxide gas to a soda mixture, the water is very cold so it can hold a lot of gas. They also use pressure to put more gas in the water than it could normally hold at that temperature. But when a soda can warms up a bit or when the can is shaken, that extra gas is really ready to come out. So when you open up the can and release the pressure, sploosh!

A water molecule is made up of one oxygen atom and two hydrogen atoms. Water makes up about 95% of most sodas. The sweetener in most soda is a mixture of a sugar called "glucose" and another called "fructose". In fact, when these two sugars are attached to each other, it makes another sugar called "sucrose." Sucrose is the regular sugar you use in iced tea or in baking. It is

made from carbon, oxygen, and hydrogen atoms. Carbon dioxide is made from one carbon atom and two oxygen atoms. The molecules of carbon dioxide are thoroughly mixed and dissolved into the water in the soda pop. When you open a soda can or bottle, the carbon dioxide will begin to come out of the soda and into the air. Eventually enough will come out and the soda will become flat.

Make it Awesome:

Add some dry ice or shake and make ice cream to make a root beer float!