



Dry Ice & Shake and Make Ice Cream

Materials:

Dry Ice	2 Quart Zip Bags
Cooler	1 Gallon Zip Bag
Hammer	Rock Salt
Thick Glove	Food Coloring
½ C Milk	¼ C Sugar
½ C Whipping Cream	Measuring Cups & Spoons
Flavorings	Plastic Spoons
Mixing Bowls	Metal Spoons

Vocabulary:

Dry Ice	Carbon Dioxide	Chemistry	Solid
Liquid	Gas	Melt	Sublimate
Bubble	Freeze	Temperature	Emulsion

Dry Ice Ice Cream Directions:

1. Crush the dry ice. Do this by placing your dry ice in a paper bag and either smash it with a mallet or hammer or roll over the bag using a rolling pin. Be sure to use gloves and tongs when handling dry ice.
2. Mix the whipping cream, milk, and sugar in a mixing bowl. Do a taste test. Adjust ingredients as needed.
3. Choose a flavoring and add a few drops. Do a taste test.
4. Add food coloring if you wish.
5. Shake the dry ice into the ice cream, a little at a time, mixing between additions.
6. As you add more dry ice, it will start to harden and will get more difficult to mix. Continue adding dry ice until the ice cream has reached the desired consistency.
7. Feel free to stir in flavorings or candy pieces.

Notes:

The ice cream may be *very* cold! Use care when eating it to avoid frostbite. If the ice cream is soft enough to stir or scoop it should be warm enough to eat safely.

You can then freeze leftover ice cream to eat later.



Shake and Make Ice Cream Directions:

1. Pour ½ C whipping cream, ½ cup milk and ¼ cup sugar into a quart sized zip bag.
2. Seal and squeeze to mix.
3. Open the bag. Add a flavoring and food coloring.
4. Squeeze out air, seal and squeeze to mix.
5. Place the sealed zip bag in another quart zip bag.
6. Squeeze out air and seal.
7. Place the zip bags in a gallon zip bag.
8. Fill the gallon zip bag ¾ full with ice.
9. Add ¼ cup rock salt.
10. Seal the gallon zip bag.
11. Shake, squeeze, etc for around 5-10 minutes. This will freeze the liquids in the smaller bags making ice cream.
12. When your ice cream is to the consistency you want, remove the inner most bag. Discard the others and the ice.
13. Use a spoon to eat your ice cream right out of the bag!

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.

What makes ice cream creamy? This ice cream is made of sugar, fat, ice crystals, and air. The more you shake, the smaller the ice crystals become and the more air is incorporated into the ice cream. Doing both makes for a creamier cream. You can also adjust the creaminess by changing the fat content of your dairy.

Why does shaking some dairy in a bag make ice cream? Ice cream is an emulsion, which means small droplets of one liquid dispersed or spread throughout another liquid. Think salad dressing. Oil and vinegar don't dissolve, but they can disperse into an emulsion with the help of a whisk. So when you shake the bag, it emulsifies the ice cream, dispersing the ice crystals, fat molecules and air.

Why do you need salt in the ice? Salt lowers the melting temperature of ice. This lets you shake that bag of ice long enough to get the ice cream to solidify. The more salt you add, the lower the melting temperature. And the colder the temperature of the icy solution around the ice cream, the faster the cream freezes. This is the same reason that salt is put on the roads when it's cold and wet. Lowering the freezing temperature (which is the same as the melting temperature!) keeps the roads covered with water, not ice.

Make It Awesome

Make a batch of Dry Ice Root Beer and add the Shake and Make Ice Cream to make a Root Beer Float!