

# TAKE & MAKE KIT

## Frozen Bubbles

TIME: 30 minutes

ADULT SUPERVISION ADVISED

Follow instructional videos on Youtube  
[@MilwaukeePublicLibrary](#)



Milwaukee Public Library Makerspaces



## What's in this kit?

There are a few perks to living in Wisconsin where the winters can reach subfreezing temperatures. **Subfreezing** is when the temperature is below 32 degrees Fahrenheit. With the cold weather comes fun activities like sledding, cozy drinks like hot cocoa, and from time to time, a few extraordinary science experiments like frozen bubbles.

### You will learn:

- Freezing point
- Water and Ice
- Bubble science

## Let's Get Started!

### Materials

2.5 tbs corns syrup  
2.5 tbs dish soap  
2 tbs sugar  
Warm water

### Tools

Medium mixing bowl  
Spoon  
Straw

## Step 1 - Create the bubble solution

Empty the corn syrup (pale yellow liquid) into a medium bowl. Using the same bottle, add three bottles of warm water into the bowl and mix to combine. (You can cap the bottle and shake it the first time to loosen the rest of the corn syrup.)



Next, add the sugar to the bowl and mix until dissolved. If you have sugar on hand, you can add another scoop of the same amount to increase the chances of faster ice formation.

Finally, add the dish soap (blue liquid) to the solution and combine. Stir gently, you don't want to create too many bubbles here.



## Step 2 - Chill the solution

Put the bubble solution in the fridge or outdoors where it's cold for at least fifteen minutes. Cooling down the solution will create faster results. You can store the solution in a sealed container for up to 1 week if you want to use it again or need to wait for the right weather conditions.



## Step 3 - Get dressed up

While your bubble solution is chilling, get dressed for going outdoors. Don't forget your coat, gloves, and anything else you need to stay safe and comfortable.

### Did you know?

Bubbles will always settle in the form of a round, spherical shape. Even if you start blowing bubbles in different shapes, they will always settle into a spherical form. This is because the bubble wants to take up the least amount of space possible which happens to be round.



### Step 3 - Bubble time



Take your straw and dip it into the solution. Bring the bottom of the straw near the surface of some snow and blow a bubble. Slowly pull away the straw from the bubble formation. Watch as ice crystals dance and form around the bubble. If ice crystals do not form after a few seconds, then the weather is not cold enough.



You can also blow bubbles into the air so they land on a pile of snow. These bubbles will generally be smaller but should still freeze over.

If your bubbles pop, the leading cause may be that it is too windy. Find a place with a bit more shelter from the wind. Try by a fence or the side of a building.

The best conditions for instant freezing is about 10 degrees Fahrenheit with no wind. If the weather is too warm or too windy and you need another activity to do with your bubble solution, check out the bonus art activity at the end.

11AM	12PM	1PM	2PM	3PM	4PM	5PM
						
10°	10°	10°	10°	10°	10°	9°

### Challenge

Take some photos or videos of your frozen bubble. This frozen phenomenon makes some pretty cool images.

What shapes do your ice crystals form in? How many sides do these shapes have?

## How does it work?

Several things come into play to make instant frozen bubbles work.

1. Soap bubbles are pockets of air trapped by water and soap. There is a layer of soap, then water, and then soap again, which encases the air.
2. Freezing water occurs at 32 degrees Fahrenheit. This doesn't mean water will freeze into ice immediately. Turning water into ice involves various conditions.
3. Ice forms when there is a crystal seed for the water molecules to hang on to. In our case the sugar in the solution really helps provide the opportunity for the water molecules to freeze into ice.

With the right conditions, the water layer of the bubble will freeze before the bubble pops.



## Go Beyond – Supercooled Water

Here is another subfreezing experiment to try. This one is a bit trickier but very cool if you can achieve it. Try preparing a few bottles if you can.

You will need a bottle of unopened distilled water and some ice. Mineral or spring water won't work in this case. Chill the bottle of water inside your freezer for 2 and a half hours. When the water is supercooled, it reaches temperatures below the freezing point (32 degrees Fahrenheit) but does not freeze into a solid state.

Once your bottled water has been supercooled, carefully remove it from the freezer and bring it to your work surface. (We recommend a big bowl or tray in case of splashing and spills.) With your ice already in the bowl, open the bottle and pour it slowly over the ice. If chilled correctly, the water will turn to either solid ice or slushie that extends from the ice in the bowl to the mouth of the bottle.





## Bonus Activity

Your bubble solution will be clear but tinted from the liquids you added to it. Did you know you can add more pigment to create colored bubbles? Try adding some food dye or craft paints. What art can you make in the snow?

We added paint to the bubble solution and made two kinds of art. The first came from colored bubbles that popped in the snow. We scooped up the colored snow and let it melt and dry on the paper.



For the second style we made bubble art! Add the colored bubble solution into a shallow dish. With your straw, blow some bubbles until they tower up in the bowl.

Quickly, swipe your paper along the top of the bowl and scoop up the colored balloons. Next, pop the balloons to get a fun and colorful effect on the card. We recommend using a heavier paper like cardstock or watercolor paper.

Be aware that these will be fun but messy. Prepare your work surface with a towel or newspaper and be ready with some paper towels to catch any big spills.



HANG OUT,  
MESS  
AROUND,  
GEEK OUT.



MILWAUKEE  
PUBLIC LIBRARY

We'd love to see what you come up with.  
Please share and tag us with your creations  
at [@MPLCreates](https://www.instagram.com/MPLCreates) on Instagram or email us  
at [MPLCreates@milwaukee.gov](mailto:MPLCreates@milwaukee.gov)