INSULATING ICE

Using different materials explore how to insulate ice cubes.

Overview

Have you ever wondered how to stop the ice cubes in your drink melting? In this investigation you will use materials from around your home to discover which help to slow down ice melting. You just need your materials, some plastic pots, sticky tape and some ice to try this out.

This investigation follows on from our Melting Ice activity, but it works as an independent activity for older children.

Printable version

This page will print, but looks a little funky. Click the button for a PDF version which looks a bit better.

What you'll need

- Clean, empty yoghurt pots or other plastic containers

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- Ice cubes trays to make ice or you can freeze a small amount of water at the bottom of your containers
- A variety of materials for testing, e.g. plastic bags, tin foil, paper, fabric, cling film…whatever you have at home
- Sellotape
- Scissors
- A timer or clock
- Paper and a pencil or pen for recording

Duration

Time for your ice to freeze. About 30 minutes to set up your investigation, then about 2 to two and a half hours for your ice to melt

Suitable for…

Age 7 and up.

Safety notes

You know your children better than anyone, and you should judge whether they're ready for this activity. You might want to think in particular about:

- Always take care when using scissors.
- Remember that plastic bags can cause suffocation.
- Spillages can make floors slippy.

What to do

Step 1

Fill up your ice cube trays with water. Try to get the same amount of water in each section so that your ice cubes are equal sizes. Put them in the freezer to freeze.

If you are freezing water directly into the bottom of your container, don't put more than a cm in each one or it will take too long to melt!

Step 2

Cut a section of your material that is big enough to wrap around your whole container, including the top.

Step 3

Use the section of the material you have just cut as a template. Cut your other materials to the same size.

You should have:

- a few sections of different material cut to the same size,
- the same number of containers.

- sticky tape and scissors.

Step 4

Wrap your material around the sides and bottom of your container and secure it with a piece of sticky tape. Leave the top of the container open.

Step 5

Do the same with your other pieces of material and containers.

Step 6

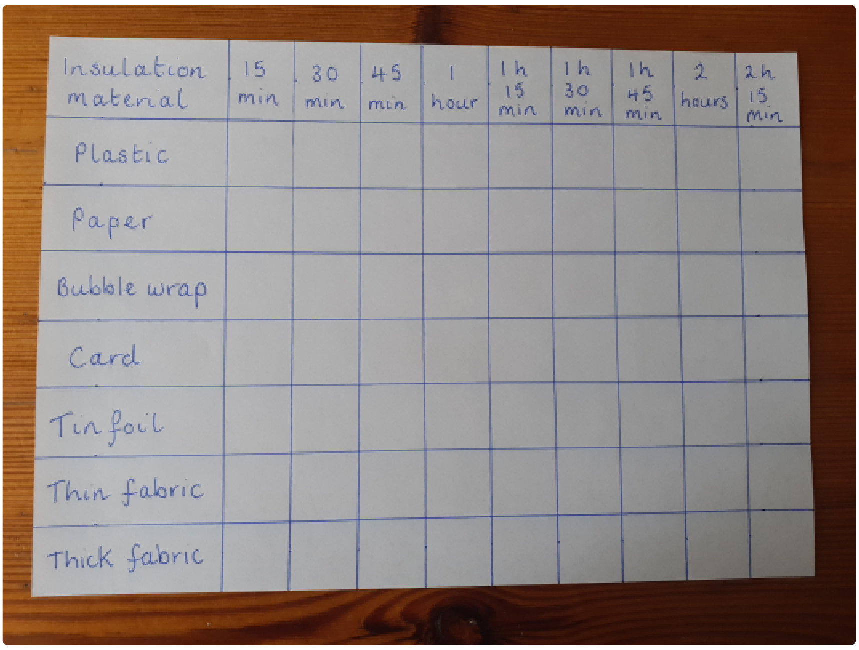
Decide where you are going to keep your ice while you carry out your investigation. It all needs to be in the same place as we want the temperature to be the same for each container.

Make sure your containers are not touching each other then put an ice cube in each container.

Step 7

Wrap up the top of your container and secure it with sticky tape. Set your timer for 15 minutes if you are using one. If not, note down the time and wait for 15 minutes.

Step 8



While you are waiting, make a chart to record the results of your investigation, use our example as a guide.

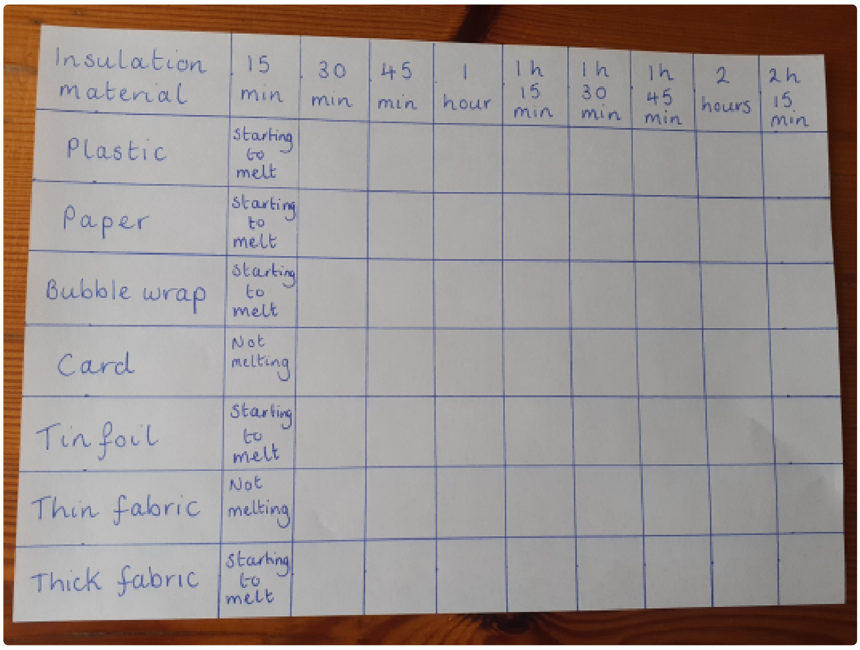
You will need to include the materials you used and the time it takes to melt, as shown in the photograph.

Step 9

After 15 minutes, unwrap the top of one of your containers and observe what has happened to the ice. Wrap up the container again before moving onto your next one.

Make sure you return your containers back to the same position.

Step 10

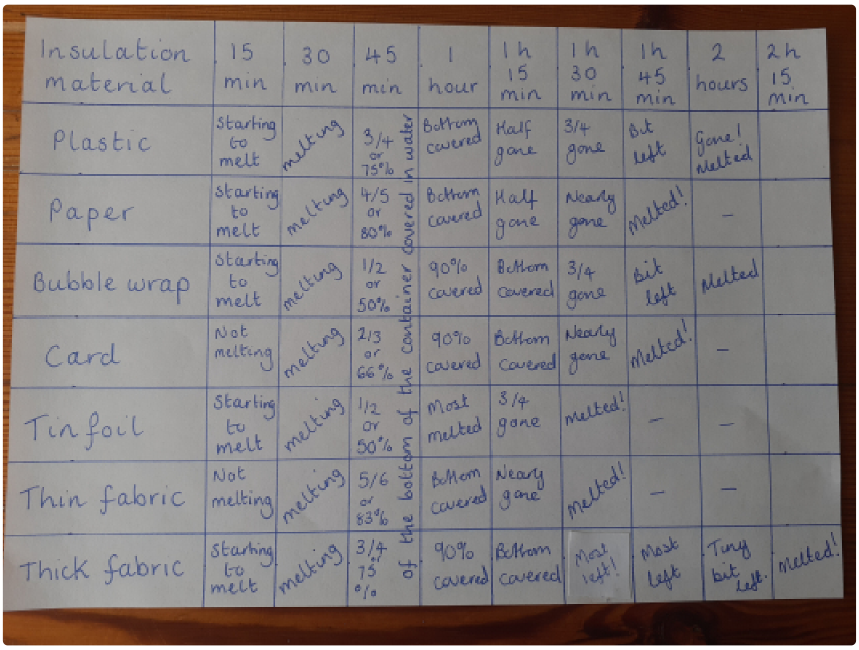


Insulation material	15 min	30 min	45 min	1 hour	1 h 15 min	1 h 30 min	1 h 45 min	2 hours	2 h 15 min
Plastic	Starting to melt								
Paper	Starting to melt								
Bubble wrap	Starting to melt								
Card	Not melting								
Tin foil	Starting to melt								
Thin fabric	Not melting								
Thick fabric	Starting to melt								

Now time another 15 minutes. Record your observations on your chart.

Has your ice started to melt yet?

Step 11



Insulation material	15 min	30 min	45 min (of the bottom of the container covered in water)	1 hour	1 h 15 min	1 h 30 min	1 h 45 min	2 hours	2 h 15 min
Plastic	Starting to melt	melting	3/4 or 75%	Bottom covered	Half gone	3/4 gone	Bit left	Gone! Melted	
Paper	Starting to melt	melting	4/5 or 80%	Bottom covered	Half gone	Nearly gone	Melted!	–	
Bubble wrap	Starting to melt	melting	1/2 or 50%	90% covered	Bottom covered	3/4 gone	Bit left	Melted	
Card	Not melting	melting	2/3 or 66%	90% covered	Bottom covered	Nearly gone	Melted!	–	
Tin foil	Starting to melt	melting	1/2 or 50%	Most melted	3/4 gone	melted!	–	–	
Thin fabric	Not melting	melting	5/6 or 83%	Bottom covered	Nearly gone	melted!	–	–	
Thick fabric	Starting to melt	melting	3/4 75%	90% covered	Bottom covered	Most left!	Most left	Tiny bit left.	melted!

Check your containers and observe what has happened to the ice every 15 minutes. You could note down information such as:

- how much of the ice has melted
- how much of the container is covered in water
- which ice cube is melting the fastest
- which is melting the slowest when the ice has completely melted

Things to discuss

- Which ice cube took the longest to melt?
- Which material was the best at keeping the ice cool?
- Why do you think this was?
- Which ice cube took the least time to melt?
- Which material was the worst at keeping the ice cool?
- Why do you think this was?
- Which material would you choose to create a covering for a cup to stop your ice from melting as quickly?

How it works

When you took your solid ice cubes out of the cold freezer and put them in different places around your home, they began to melt. The temperature in your home is usually around 18°C. When ice is in a place that is above 0°C, it begins to melt and becomes liquid – water. In places where your home was warmer, the ice melted more quickly.

The reason your ice melted is because it absorbed energy from the room it was in. It does this when energy is transferred to it through the materials it is touching or the air surrounding it. You tried to stop your ice absorbing energy by insulating it with your different materials.

Good insulators are materials that do not conduct or transfer energy well and keep your ice from melting. Things like polystyrene, bubble wrap and cotton wool are good insulators. Materials that are good conductors transfer energy quickly. Metals are a good example of conductors.

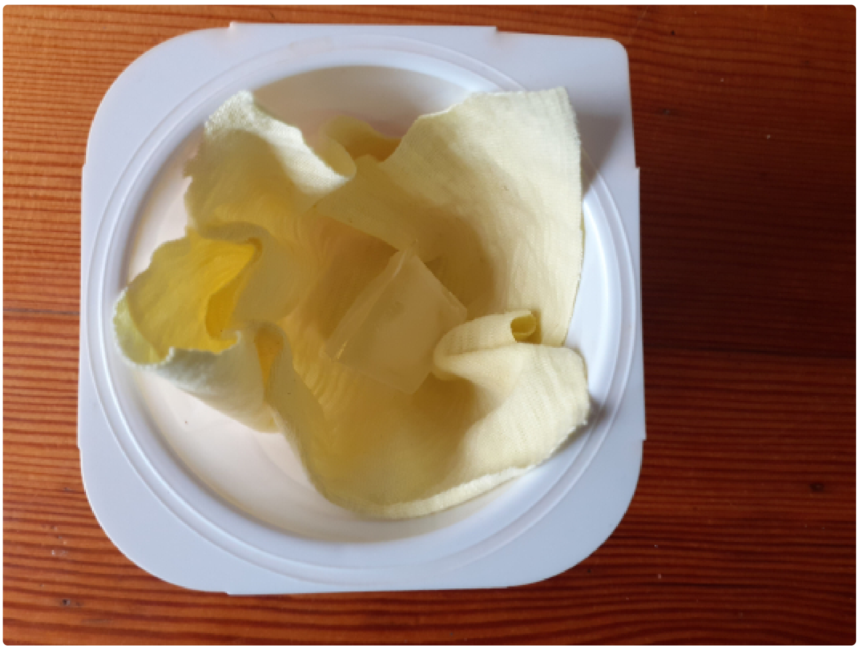
Other things to try

Insulate the inside of your container

You will need: plastic containers, a selection of materials, scissors, ice cubes.

Cut a piece of one of your materials big enough to wrap up an ice cube.

Put your material inside your container, then put your ice cube inside the material.



Wrap fold over the material so that the ice cube is covered.

Check every 15 minutes and see how long it takes the ice to melt.

This time you won't be able to see how much your ice is melting, as some of the materials will absorb the water.

Things to discuss

- Did the ice cubes take a longer or shorter time to melt when they were insulated in this way?
- Why do you think this happened?
- Which investigation did you find more interesting and why?

Other things to try

Wrap your containers in tinfoil

Try covering your insulated container with tin foil. Foil is a good insulator and will keep the ice cube cooler for longer.

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