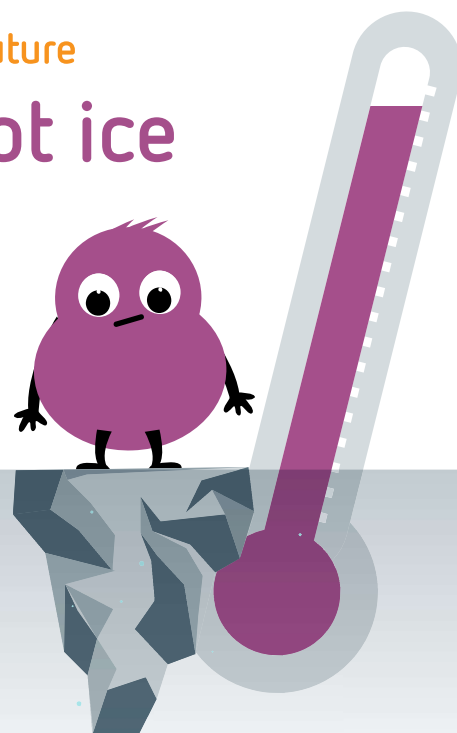


Innovating for the future

Making hot ice



About this activity

In this experiment you will try to create a substance that is liquid at room temperature but when disturbed immediately crystallises to form something known as 'hot ice'. Hot ice is an amazingly cool substance and the ingredients are easy to find. However, it is tricky to make, so it may take you a few attempts to get it right!

Time

1-2 hours

Kit list

- ✓ 1 litre clear (not malt) vinegar
- ✓ 4 tbsp baking soda (sodium bicarbonate)
- ✓ Steel saucepan
- ✓ Plastic container

Next steps

How It Works is the action-packed magazine that's bursting with the answers to your curious questions - every issue is jam-packed with the most exciting advances in science and technology and features everything you need to know about how the world around you - and the universe - works. **Exclusive offer for schools and students!** Get *How It Works* for 6 months for £9.99 plus other great offers over at: magazinesdirect.com/bsw2021 or telephone 0330 333 1113. Please use code: 89AA. Offer ends 30 September 2021.

Watch out!

This experiment should only be performed under adult supervision. The saucepan and liquid will be very hot and extreme care must be taken. Do not cover your liquid when it is still boiling, as the pressure may cause the container to explode. While this form of hot ice is non-toxic, it should not be consumed.

Instructions

Measure 1 litre of clear vinegar and **slowly** add 3-4 tablespoons of baking soda. Stir until it is dissolved and then put the mixture on the heat to boil.

- 1 Leave to boil for 30 minutes. You'll start to notice a white substance on the side of the pan. This is sodium acetate, save a bit of this to use later.
- 2 When you see a crust (sodium acetate anhydrous) begin to form, take the liquid off the heat and transfer it to a container. Cover the container to prevent the substance crystallising, then cool it in an ice bath for 15 minutes, or a fridge for a bit longer.
- 3 The liquid needs to cool below room temperature to become a supercool liquid. Once it has cooled, take the lid off and add some of the white sodium acetate you collected earlier.
- 4 As the sodium acetate is introduced, the liquid will begin to crystallise and after a few seconds the entire liquid will 'freeze'. However, if you

touch it, the substance will feel hot not cold, because the process of crystallisation is exothermic. That means that heat is given off, so the liquid turns into a solid.

Most substances have a freezing point, where the molecules rearrange from a liquid into a solid or crystal arrangement. Sodium acetate trihydrate, or hot ice, is a supercool liquid, which means even though it's a liquid at room temperature, the molecules will rearrange into solid form when disturbed (by adding sodium acetate).

Skills set

Observant, Patient, Curious

Career options

If you're interested in chemical reactions, you can spark change by working in the lab as a chemist or at a power plant, where you'll be dealing with the management of substances - some of which are useful for improving our lives. You could even become a chemistry teacher, educating the next generation and carry out this experiment with your class.

Here's the reaction for this experiment and a bit about what's happening:

