British Science Week 22th – 26th March 2021: Innovating for the future

	Monday	Tuesday	Wednesday	Thursday	Friday
Form Time	Poster Competition/Assembly	Poster Competition/Assembly	Poster Competition/Assembly	Poster Competition/Assembly	Poster Competition/Assembly
Activity	Go to this website and summarise a super power that struck you	Create some "hot ice" by following the instructions on page 2 *** This MUST ONLY BE DONE WITH ADULT SUPERVISION at home ** Use excess baking soda	Build a working waterwheel by following the instructions on page 3	Science is everywhere- why not try out this homemade hair mask with your family and see its magical effect?	Write a poem with the title "Innovating for the future"

You can complete the activities individually or in groups (maximum 3 people from your year group) at home and send in photos/reports of your efforts to either Mrs Mak or Miss Sharpe.

Year 8 and 9 please send your project(s) to Mrs Mak nmak@bdb.surrey.sch.uk

Year 7, 10 and 11 please send your project(s) to Miss Sharpe tsharpe@bdb.surrey.sch.uk

Lois Grimshaw | Interim Head of Science
February 2021

BRITISH SCIENCE WEEK

HOW IT WORKS

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).

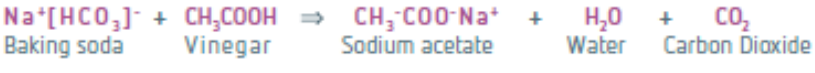
Skills set

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:



BRITISH SCIENCE WEEK

Leeds Museums & Galleries

Innovating for the future

Build a working waterwheel

About this activity

In this activity you're going to be building a waterwheel (which could be used to generate renewable electricity). You can experiment with dropping water from a greater height or with greater force to see if it affects how quickly the wheel moves.

Historically waterwheels have been used to power machinery in Victorian mills but today they can be used to generate sustainable electricity.

Time

1 hour

Kit list

- Thick card or plasticard (for a more durable waterwheel).
- Pen/pencil
- Plate (to use as a template)
- Wooden doweling (or round pencil)
- Disposable cups
- Scissors
- Adhesive
- Bottle/watering can/hosepipe or dried beans
- Bucket/washing up bowl (or do this outside!)

Next steps

- Go to MyLearning (mylearning.org) and type 'waterwheel' in the search bar to learn more about the history of waterwheels and how they have been used in the past as well as how we can harness water for renewable energy into the future!

Watch out!

When cutting and attaching be careful not to cut yourself.

You might get wet! Quickly mop up any spills or the floor will get dangerously slippery.

Instructions

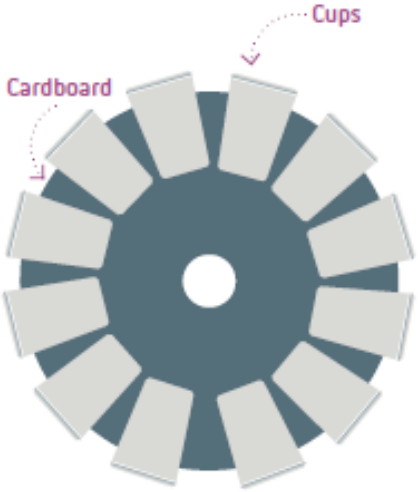
1. Use a circular template (such as a plate) and draw two big circles on the plasticard/thick cardboard, then cut out the circles to form the sides of your wheel
2. Mark the centre of the circles and cut a hole in the middle of each of them. The hole in the centre should be wide enough to fit the axel (doweling or pencil). Then use split pins or tape to attach plastic cups to the edge of the wheel (it will work best if you use at least 4 cups). Make sure the cups are positioned at around a 45 degree angle to the edge of the wheel.
3. Once you've built the wheel, push the doweling or circular pencil through the holes in the middle of the wheel, and mark a point on the wheel so you can count its rotations.
4. Now it's time to test! Hold the water wheel above the bucket or bowl, and pour water into the waterwheel from above to make it turn (you could also pour dried beans from a bottle instead of water)
5. Try pouring water from different heights to see if the speed of the wheel changes or try increasing the stream of water and observe whether the wheel speeds up.

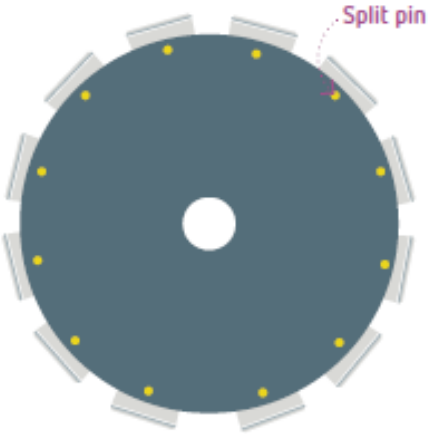
At home

How is the electricity you use at home generated? Can you think of any alternative sources that homes could get their energy from in the future that would make for a more sustainable planet? How might these work?

Skills set

Creative, Observant, Curious





Career options

There are many different career options within museums and historic sites, including engineers, maintenance (historical preservation), joiners, and many more.

Example table of results (scientific investigation)

Height water poured from	Number of wheel rotations in 30 seconds
1cm	
10cm	
20cm	

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