

Exploring gas

Presentation notes for teachers



Use these notes to accompany the Exploring Gas presentation.

Slide	
1	Exploring Gas: <i>title slide</i>
2	<i>Links to further resources</i>
3	What is a gas?
4	Everything – in the whole world – is either a solid...
5	...a liquid...
6	...or a gas. We call these the three states of matter.
7	Solids are rigid – this means they don't move. They have a definite shape – which doesn't change (unless you squash or stretch them).
8	Liquids are not rigid – they can move around. They have no definite shape – you need a container to keep them where you want them, like a bottle or a glass. They take on the shape of the container.
9	Gases are not rigid – they can move around. They have no definite shape - you need a container to keep them where you want them. They take on the shape of the container, moving quickly to fill the space. If there's no lid, they'll escape and keep on spreading out as far as they can go.
10	Here are some more examples of solids, liquids and gases. Show children each of the images on this and the following slides, ending with the teddy bear <i>Can they say which are a solid, liquid or gas?</i> <i>Remind children about their properties (eg whether they are rigid or hold their shape etc)</i> <i>You could talk about:</i> <ul style="list-style-type: none"> • <i>ice being a solid which turns to a liquid when it melts – it holds its shape (a cube) as a solid, but not when it melts</i> • <i>the smoke is not in a container so will just keep going until you can't see it anymore etc</i>

Slide	
15	<p><i>(Teddy bear slide)</i></p> <p><i>Can children give you more examples of solids, liquids and gases?</i></p>
16	<p>Solids, liquids and gases are all made up of tiny particles called molecules. They are too small for us to see without a microscope. Something will be a solid a liquid or a gas depending on how these particles behave.</p> <p>In solids, the molecules are closely bonded to each other so the solid holds its own shape.</p> <p>In a liquid, the bonds are weaker, so the liquid moves and takes the shape of its container.</p> <p>In the gases, the bonds are very weak. A gas fills its container .</p>
17	<p><i>Try some of the experiments in the Classroom gas experiments resource to explore gas further.</i></p>
18	<p>Gas in our homes</p> <p><i>The following slides can be used to introduce children to gas as a form of energy in their own homes, where it comes from and the heritage of gas.</i></p> <p><i>Can they think of anywhere we might use gas in our homes?</i></p>
19	<p>Here are some clues... <i>(invite responses from the children)</i></p> <p>We use gas to cook our food and heat our homes.</p> <p>The gas we use is flammable – this means it burns if you set light to it, making it useful for creating light and heat.</p> <p>Do you know where it comes from?</p>
20	<p>Today, the gas we use is natural gas, found deep underground – often under the sea. Once the gas has been collected, it must be safely transported from where it is found, to where it is needed – such as in our cookers.</p> <p>One of the best ways to transport gas – especially if it has to travel a long way - is to first change it into a liquid so that it can be placed into containers. This involves cooling it down to extremely cold temperatures - much lower than the temperatures in our freezers. The resulting liquid is known as Liquid Natural Gas, or LNG.</p> <p>Huge, highly-specialised tankers (ocean-going ships) are used to transport LNG to countries around the world. It is held in large ‘cryogenic’ storage containers which keep the gas at a super-cooled temperature of -160°C.</p> <p>Most tankers are about 300 metres long and 43 metres wide – that’s as wide as a football pitch and twice as long!</p> <p>When the tanker reaches its destination, the Liquified Gas is returned to its gaseous state at a special terminal, and then piped through natural gas pipelines to where it is needed.</p>
21	<p>But before we discovered Natural Gas, we used to make the gas for our homes by burning tons and tons of coal in a gasworks.</p> <p>Working in the gasworks was hard and hot work.</p>

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22	<p>EVERY town and city had a gasworks.</p> <p>This included a structure called a gas holder. They were often huge – like this one which you can still see at the Oval cricket ground in London.</p> <p>It's a bit like a giant version of the Coke bottle and balloon experiment in the Classroom gas experiments resource.</p> <p><i>(You could use the 'Your Gas Heritage' resource to find out where the gasworks was in your own area, and what happened to it: nationalgridgas.com/resources-teachers).</i></p>
23	<p><i>Ask the children if they know what people used to light their homes and the streets BEFORE gas lights were invented?</i></p> <p>They mainly used candles – or rush lights, a type of plant that was dipped in animal fat (ugh!) and set light to. They were pretty dirty and smelly and didn't give off much light.</p> <p>Then...something amazing happened. William Murdoch invented gas lights which were much brighter and didn't smell at all!</p> <p>This picture shows some of the first public gas lighting in Britain. It appeared in London in 1807, when 13 lamps were installed along Pall Mall in London, to celebrate the birthday of George III. They continued burning until midnight, causing huge excitement and wonder.</p>
24	<p>Now, we use electricity to power most of the gadgets in our homes, but we used to use gas.</p> <p><i>Here are some mystery objects that used gas – can children guess what they are, or use their enquiry skills to work it out?</i></p> <p>Here's an easy one to start with...</p> <p>Cast Iron Cooker (late 1800s) Look closer: Why do you think the handle is made of wood?</p> <p>Enamel Cooker in Chinese design (1930s) Look closer: How many differences can you see between the two cookers, designed 50 years apart?</p> <p>More info Cast iron gas cookers were first produced in the 1830s – nearly 200 years ago. The cast iron made these cookers very heavy and difficult to clean.</p> <p>From the 1900s (about 100 years ago), enamelling was introduced to cooker design. Not only did this make them easier to clean, but also meant they could now be produced with different colours and patterns.</p>
25	<p><i>What do children think this is?</i></p> <p>Gas light, 1920s</p> <p>Look closer What can you see painted onto the lampshade? Can you see how this light is turned on and off?</p> <p>More info This lamp is designed in a 'Chinese style' – which was very popular in the 1920s and 30s (like the cooker on the previous slide).</p>

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26	<p><i>What do children think this is?</i></p> <p>Gas radiator, 1890s</p> <p>Look closer What can you see written at the bottom of the radiator? Why do you think this was important? Can you see where the gas would flow into the radiator? How is this different to modern radiators?</p> <p>More info In this early gas radiator, each of the metal tubes was heated by a gas burner in the base. The heat would then radiate outwards from the tubes and from the grill at the top. The legs at the bottom made sure the floor didn't get too hot.</p>
27	<p><i>What do children think this is?</i></p> <p>Gas hairdryer, 1920s</p> <p>Look closer Can you see what the hairdryer is made from? Do you think it would be safe to touch while it was being used? How is this different to hairdryers today?</p> <p>More info Hairdryers like these were used in hairdressing salons. A small gas burner was lit at the bottom and the hot air produced was drawn up to the hood which directed it towards a customer's head. This hairdryer was used in a hairdresser's in Nottingham, right up until the 1960s - they preferred it to the more modern electric dryers which could be noisy. Unlike modern hand-held hairdryers there was no mechanism to 'blow' the hot air.</p>
28	<p><i>What do children think this is?</i></p> <p>Gas radio</p> <p>Look closer What is this radio made of? Can you see the names of the different radio stations in the dial at the centre? What do radios look like today? What other devices can be used to listen to the 'radio'?</p> <p>More info The gas-powered radio was developed in 1938 by Henry Milnes. It was linked to a generator which created an electrical charge when heated by gas. The charge was stored in an accumulator – a sort of rechargeable battery. The development of the gas radio was interrupted by the start of the Second World War in 1939 and, despite the potential, it never really took off.</p>
29	<p><i>What do children think this is? (See next slide for a clue)</i></p>
30	<p>Here's a clue...</p> <p>Gas waffle maker, 1950s</p> <p>Look closer How many waffles can this waffle iron make at once? Do you know how waffles are made? Why do you think you need to turn the waffle iron over halfway through cooking it?</p> <p>More info This waffle maker was heated by gas in the chamber underneath. Halfway through cooking, the waffle iron could be rotated on pivots at each end to heat the other side of the waffle.</p>

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31	<p><i>What do children think this is?</i></p> <p>A gas bath</p> <p>Look closer</p> <ul style="list-style-type: none"> • What is this bath made from? • Can you see where the gas is piped in? • What do you think might have happened if you got into the bath before turning off the gas burner? <p>More info</p> <p>Baths fitted with a gas burner underneath one end of the tub were introduced in the 1850s (over 150 years ago). Although this meant the bath could be filled directly from the tap, without the need for heating it first on a stove, the design was not entirely successful: the water could take a very long time to heat up – not to mention the potential for burnt bottoms!</p>
32	<p><i>What do children think this is?</i></p> <p>Combination washing machine and dishwasher, 1920s</p> <p>Look closer</p> <ul style="list-style-type: none"> • How might it have been filled with water, and emptied again? • How much washing do you think could fit into this machine at once? • How is it different to a modern washing machine or dishwasher? <p>More info</p> <p>This unusual combination machine could be used as a washing machine or a dishwasher. The handle on the side was used to move the wooden ‘dolly’ – a long wooden pole with wooden prongs at the bottom – backwards and forwards to swish the washing around in the water. The basket could be lifted into the machine for dishwashing, or taken out for clothes washing.</p>
33	<p><i>What do children think this is?</i></p> <p>Converted Gas Car, 1940s</p> <p>Look closer</p> <ul style="list-style-type: none"> • What do you think is happening in this picture? • How can you tell this is NOT a modern-day vehicle? <p>More info</p> <p>During World War II, there was a great shortage of lots of things – including petrol. Many cars, buses and lorries were adapted to run on gas. This would usually include a large ‘bag’ strapped to the top of the vehicle to store the gas, which was then fed to the engine where it was used in a similar way to petrol or diesel.</p>
34	<p><i>Lighting London Video</i></p> <p>There are still 1500 gas lamps operating in London. Five ‘lamp attendants’ are employed to maintain them, riding between them on motorbikes – but where do they keep their ladders?!</p> <p>Click on the image to start the film or see: https://youtu.be/v2BjX1bIK4I</p>
35	Presentation end