












Properties and Changes of Materials: Irreversible Changes

<p>Aim: To explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda by identifying and observing irreversible chemical changes.</p> <p>I can identify and explain irreversible chemical changes.</p>	<p>Success Criteria: I can identify irreversible chemical changes. I can explain irreversible chemical changes. I can describe the new materials created in irreversible chemical changes.</p>	<p>Resources: Lesson Pack Warm milk (approximately 40°C, and not hotter than 45°C)- store it in a vacuum flask for ease of use White (distilled) vinegar Mixing bowls or beakers Tablespoons Bicarbonate of soda Cardboard Balloons Plastic bottles.</p>
<p>Key/New Words: Reversible, irreversible, physical, chemical, reaction, reactant, product.</p>	<p>Preparation: Differentiated Identifying Changes Activity Sheet per child. Differentiated Irreversible Changes Activity Sheet per child.</p>	

Prior Learning: The children will have learnt about changes of state in Year 4. They will have learnt about reversible changes in lesson 5 of this unit.

Learning Sequence

	<p>Kitchen Creations: Ask the children if they have ever fried an egg or watched one being fried. What happens to the egg? How does it change? Explain about chemical changes. Explain the irreversible changes that happen to the egg using the information on the Lesson Presentation. Ask the children to talk to their partner to identify the reactant and the product of the chemical change.</p>	
	<p>Reversible or Irreversible? Ask the children to sort the pictures of materials changing on their differentiated Identifying Changes Activity Sheet by cutting and sticking them in the correct column. <i>Look for children who can identify reversible and irreversible changes.</i></p>	
	<p>Seeing Changes: Explain that the children should work in groups to carry out two irreversible chemical changes to make new materials. Following the instructions on the Lesson Presentation, the children should mix warm milk with vinegar, and then bicarbonate of soda with vinegar. As they complete each activity, explain the new materials they have made and their uses using the information on the Lesson Presentation. The children should complete their Differentiated Irreversible Changes Activity Sheet to describe the irreversible changes and explain the new materials created. <i>Look for children who can explain the irreversible changes and identify the useful new materials created.</i></p>	
	<p>True or False? Ask the children to decide if the statements on the Lesson Presentation are true or false. Reveal the answers on the Lesson Presentation.</p>	
<p>  Use the key words to complete the explanations.  Use the key words to write their own explanations.  Think of and write their own explanations. </p>		

Taskit

Spotit: Can you identify any irreversible reactions occurring around school or home? Think of the meals you eat, and the materials you use.

Researchit: Why not find out about scientists who have used chemical changes to create useful new materials? Good examples include Spencer Silver or John McAdam.

Investigateit: Irreversible changes don't always create useful new materials. Investigate the conditions that cause rust to form - an unhelpful irreversible change.



Science

Properties and Changes of Materials

Irreversible Changes



Aim

- I can identify and explain irreversible chemical changes.

Success Criteria

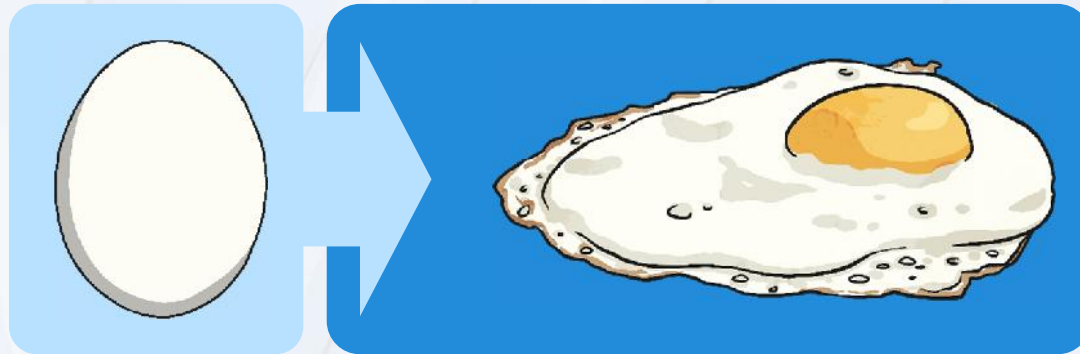
- I can identify irreversible chemical changes.
- I can explain irreversible chemical changes.
- I can describe the new materials created in irreversible chemical changes.

Kitchen Creations



Have you ever fried an egg or watched an adult fry one?

How did the eggs change?



The egg shell is cracked, and the raw egg pours into the pan. As the liquid egg white and yolk are heated, they start to change. The clear liquid egg white firms up and becomes opaque white. It changes into a solid. The orange liquid egg yolk also solidifies and turns lighter in colour.

Kitchen Creations

The heat causes an irreversible chemical change to occur.

The cooked egg cannot be cooled and turned back into a raw egg. It is a chemical change because a new product has been made, and irreversible because it cannot be changed back.

Melting, freezing, evaporating, condensing and dissolving are examples of reversible physical changes.



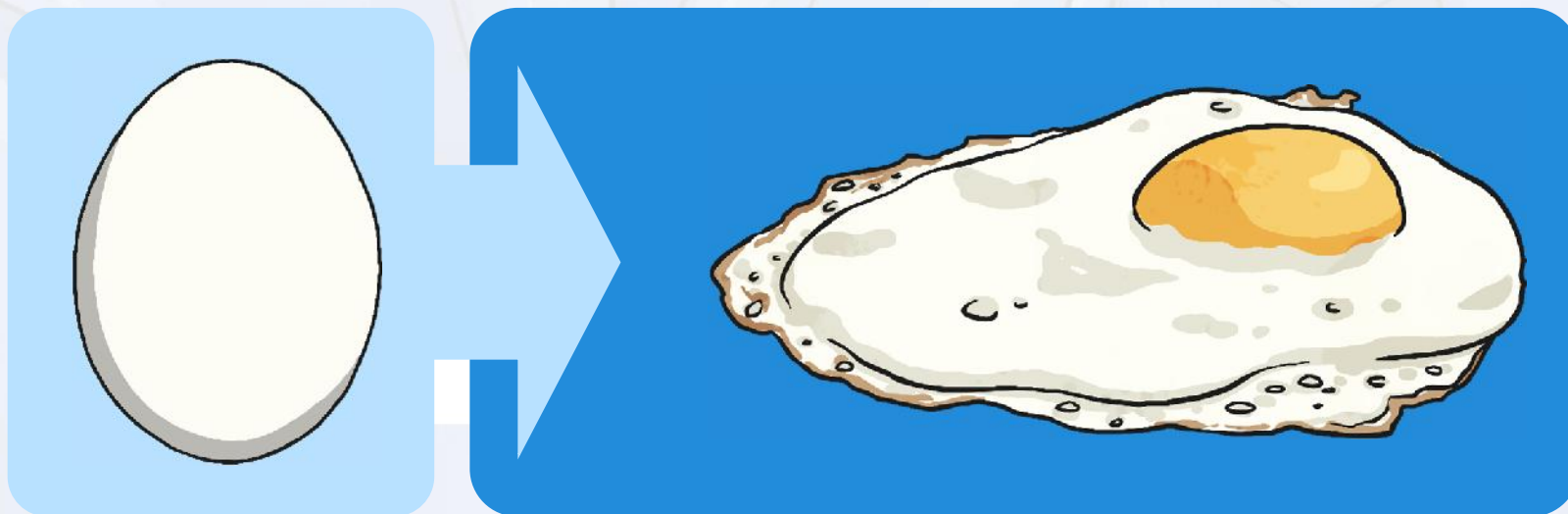
These are physical changes because no new materials are created. They are reversible changes because they can be changed back or reversed.

Kitchen Creations

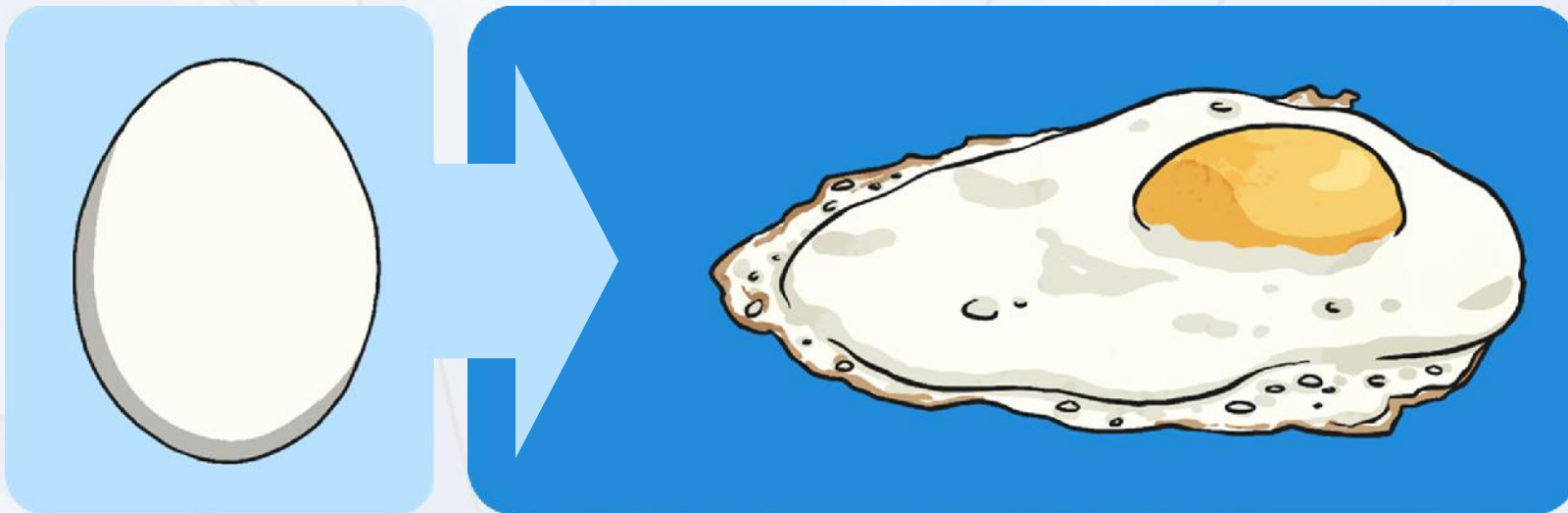


Chemical changes involve reactants and products.
The reactants are the materials that you start off with,
before the chemical change happens.
The products are the materials that are formed in the chemical change.

What was the reactant and what was the product in the egg example? What caused the chemical change?



Kitchen Creations



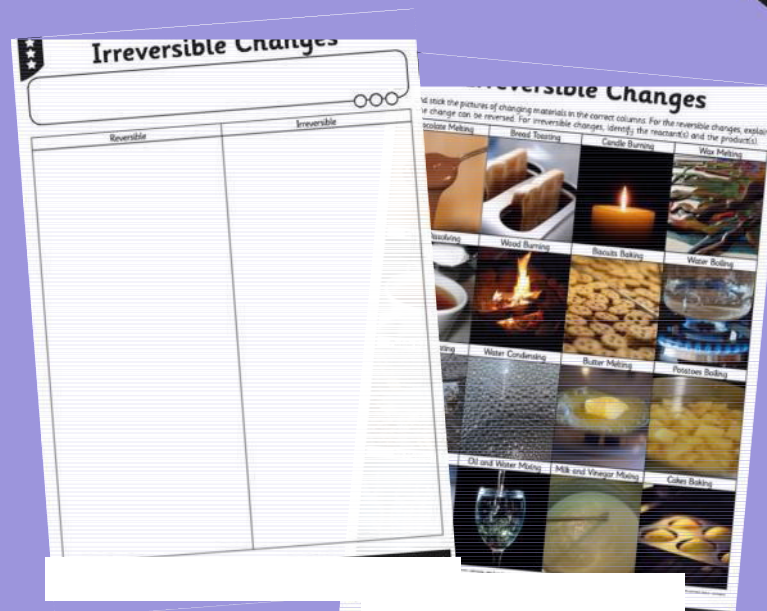
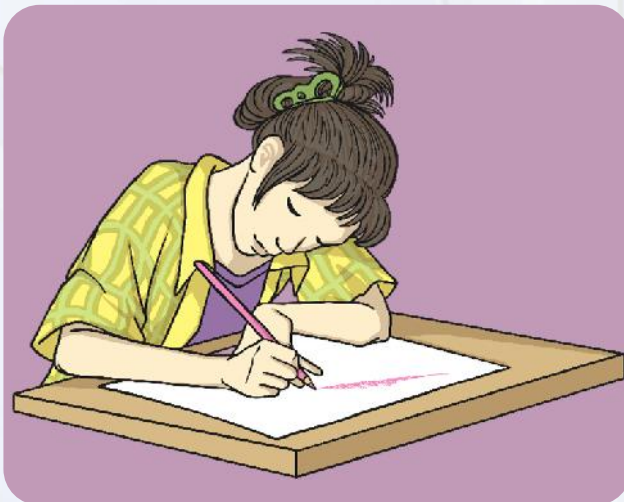
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occur.



Reversible or Irreversible?



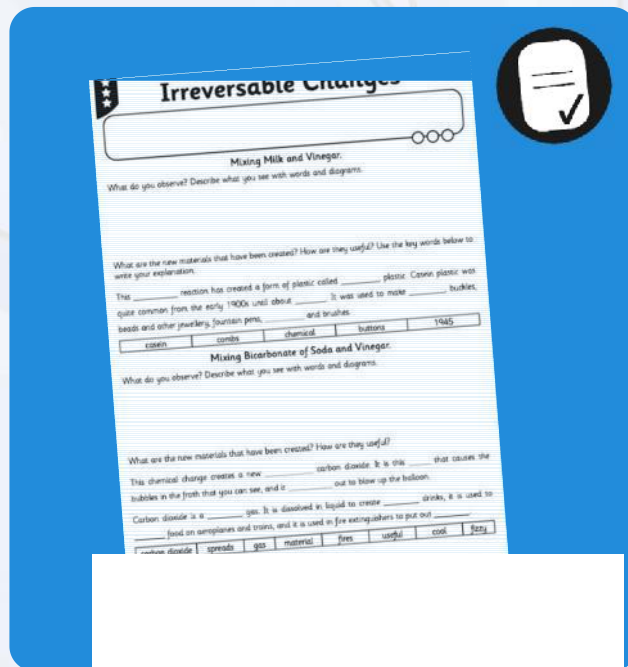
Can you sort the pictures of changes into the Reversible or Irreversible columns on your Identifying Changes Activity Sheet?



Seeing Changes



Try some irreversible changes for yourself! Can you make any new materials?
Complete your Irreversible Changes Activity Sheet as you carry out the activities.



Seeing Changes – Mixing Milk and Vinegar



Mix 250ml of warm milk with a tablespoon of white vinegar.

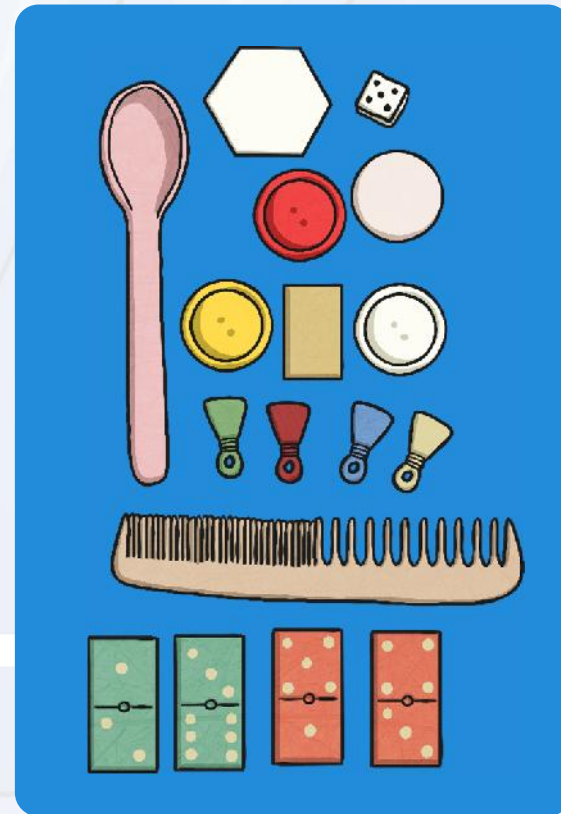
What do you observe?



As you mix the vinegar with the milk, it begins to curdle. It separates into clumps of solids floating in thin watery liquid.
Strain the mixture to separate the solids from the liquid.
The solids you are left with are a new material. This chemical reaction has created a form of plastic called casein plastic.
The casein plastic can be moulded into shapes and left to dry.

Seeing Changes – Mixing Milk and Vinegar

Casein plastic was quite common from the early 1900s until about 1945. It was used to make buttons, decorative buckles, beads and other jewellery, fountain pens, the backings for hand-held mirrors, and fancy comb and brush sets.



Seeing Changes – Mixing Bicarbonate of Soda and Vinegar



Use a cardboard cone to put 50g of bicarbonate of soda into a balloon.

Pour 50ml of white vinegar into a plastic bottle.

Stretch the balloon over the top of the bottle without letting the bicarbonate of soda fall in.

Lift up the balloon to let the bicarbonate of soda fall into the vinegar.



Seeing Changes – Mixing Bicarbonate of Soda and Vinegar

What did you observe?

Carbon dioxide is a useful gas. It is dissolved in liquid to create fizzy drinks, it is used to cool food on aeroplanes and trains, and it is used in fire extinguishers to put out fires.





True or False?

Use what you have learnt to decide whether these questions are true or false. After you have made your decisions click on the questions to see if you were correct.

Melting chocolate is an irreversible change.

Heating materials always causes reversible changes.

An irreversible change is one that cannot be changed back.

Reversible changes create new materials.

Irreversible changes can create useful materials.

Baking bread is an irreversible change.

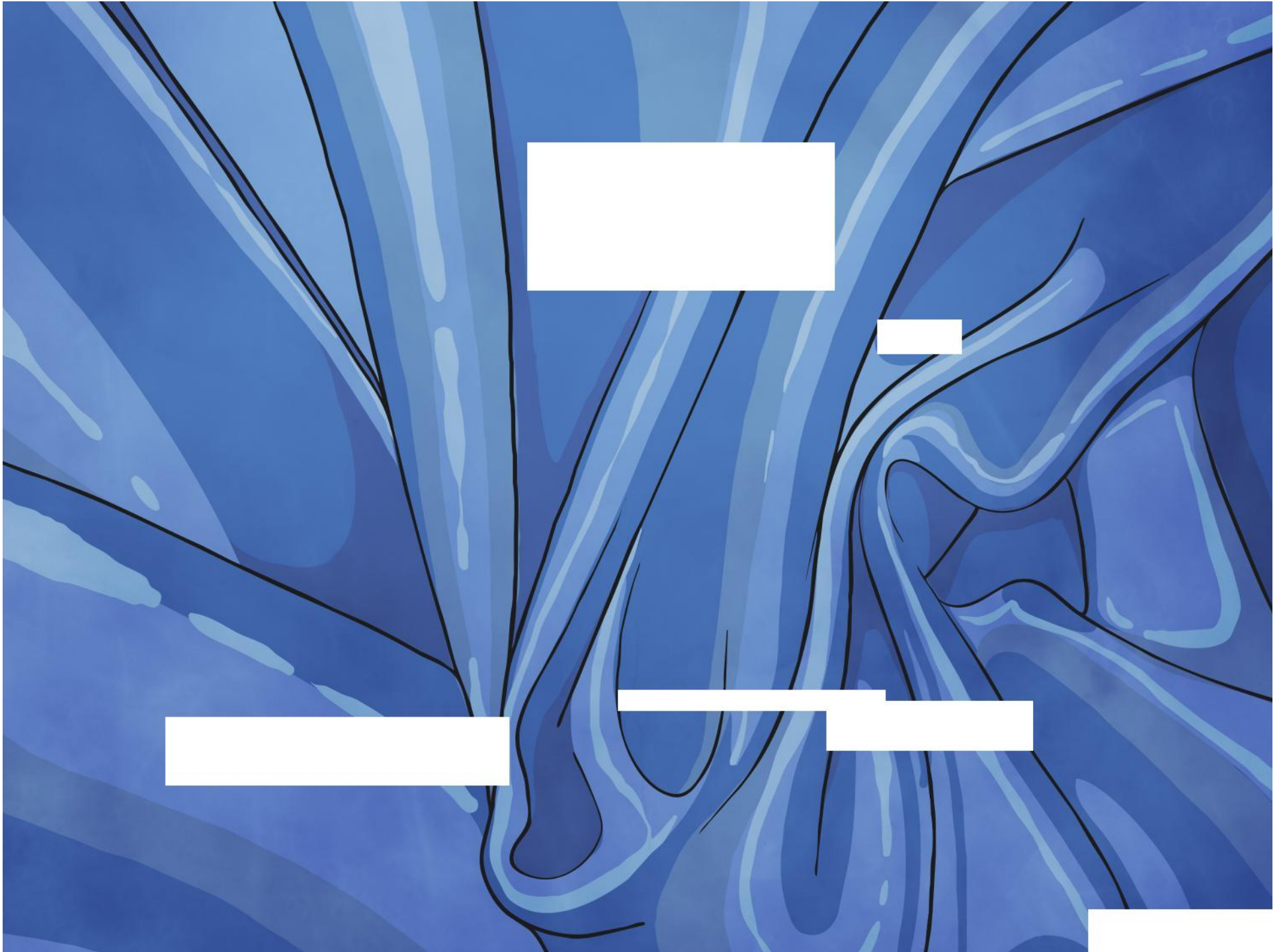
Aim



- I can identify and explain irreversible chemical changes.

Success Criteria

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Identifying Changes

Empty rounded rectangular box with a decorative line and three circles on the right side.

Reversible	Irreversible



Identifying Changes

Cut and stick the pictures of changing materials in the correct columns.

Chocolate Melting 	Bread Toasting 	Candle Burning 	Wax Melting 
Sugar Dissolving 	Wood Burning 	Biscuits Baking 	Water Boiling 
Puddle Evaporating 	Water Condensing 	Butter Melting 	Potatoes Boiling 
Ice Melting 	Oil and Water Mixing 	Milk and Vinegar Mixing 	Cakes Baking 



Identifying Changes

Empty rounded rectangular box for notes.



Reversible	Irreversible



Identifying Changes

Cut and stick the pictures of changing materials in the correct columns. For the reversible changes, explain how the change can be reversed. For irreversible changes, identify the reactant(s) and the product(s).

Chocolate Melting	Bread Toasting	Candle Burning	Wax Melting
			
Sugar Dissolving	Wood Burning	Biscuits Baking	Water Boiling
			
Puddle Evaporating	Water Condensing	Butter Melting	Potatoes Boiling
			
Ice Melting	Oil and Water Mixing	Milk and Vinegar Mixing	Cakes Baking
			



Identifying Changes

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Water condensing	Milk and Vinegar Mixing
Melting butter	Cake baking
Ice melting	
Oil and water mixing	



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Oil and water mixing	



Irreversible Changes

Mixing Milk and Vinegar.

What do you observe? Describe what you see with words and diagrams.

What are the new materials that have been created? How are they useful? Use the key words below to write your explanation.

This _____ reaction has created a form of plastic called _____ plastic. Casein plastic was quite common from the early 1900s until about _____. It was used to make _____, buckles, beads and other jewellery, fountain pens, _____ and brushes.

casein	combs	chemical	buttons	1945
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Mixing Bicarbonate of Soda and Vinegar.

What do you observe? Describe what you see with words and diagrams.

What are the new materials that have been created? How are they useful?

This chemical change creates a new _____ carbon dioxide. It is this _____ that causes the bubbles in the froth that you can see, and it _____ out to blow up the balloon.

Carbon dioxide is a _____ gas. It is dissolved in liquid to create _____ drinks, it is used to _____ food on aeroplanes and trains, and it is used in fire extinguishers to put out _____.

carbon dioxide	spreads	gas	material	fires	useful	cool	fizzy
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Irreversible Changes



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