



Holly Park Learning Organiser

Year 5 - Science



Reversible and irreversible change -

Which changes are reversible and which are irreversible?

Prior Knowledge:

Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Essential Knowledge:

Children learn about the process of dissolving and explore the difference between soluble and insoluble substances. By the end of this step, children should know that a soluble substance can dissolve in a liquid to make a solution. Two examples of soluble substances are salt and sugar. Insoluble substances cannot dissolve in a liquid. Two examples of insoluble substances are sand and flour. Children should be aware that increasing the temperature of a liquid and stirring it will increase the rate at which soluble substances dissolve in it.

children explore the processes of filtering and sieving, which are used to separate certain mixtures.

children explore the process of evaporation and how this can be used to separate a soluble solid from a liquid.

, children look at reversible changes. These are changes that can be reversed, such as dissolving and changes of state. If you can retrieve the substances that you started with, then the change is reversible.

children identified reversible changes, such as changes of state, dissolving, and separating solid mixtures. In this small step, children look at changes that cannot be reversed. When substances cannot be changed back to how they were before the reaction took place, the change is irreversible. Some irreversible changes result in the formation of new materials, for example, burning.

Key Questions:

- What does “dissolving” mean? • What is a substance? • What is a solution? • What does “soluble” mean? • What does “insoluble” mean? • Is salt soluble or insoluble in a liquid? • Is sand soluble or insoluble in a liquid? • How can you tell if a substance has dissolved in a liquid? • How does temperature affect the rate of dissolving? • What is the difference between melting and dissolving?
- Which substances are soluble in water? • Which substances are insoluble in water? • What type of mixture can be separated by sieving? • What type of mixture can be separated by filtering? • How can sand be separated from rice? • How can sand be separated from water? • What equipment is needed for filtering? • Why can sugar and water not be separated by filtering?
- Why can filtration not be used to separate salt from a liquid? • Why can sieving not be used to separate sugar from a liquid? • What happens when salt is added to water? • What is evaporation?
- What are the three states of matter? • What is melting/condensation/evaporation? • Water is cooled in a freezer. It forms ice. How can the ice change state to water? • Some salt is dissolved in water. How can this be reversed? • What is a reversible change? • What are two examples of reversible changes?
- What is an irreversible change? • What are some examples of irreversible changes? • Are changes of state reversible or irreversible changes? • Why is burning an irreversible change? • What are some examples of burning?

National Curriculum Objectives:

- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- 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.

Key Vocabulary

dissolve	when a solution is made from a liquid and one other substance
soluble	can dissolve in a liquid
insoluble	cannot dissolve in a liquid
solution	made by dissolving a substance in a liquid
substance	what something is made up of
sieve	equipment used to separate solids of different sizes
filter paper	equipment used to separate insoluble solids from a liquid
mixture	two or more substances that can be easily separated
filtering	a method of separating insoluble solids from a liquid
evaporation	the change of state from a liquid to a gas which happens slowly from a surface of a liquid
mixture	two or more substances that can be easily separated
states of matter	the different forms that materials can take
reversible change	when a change can be undone to get the same substances back again
reverse	to go back
chemical reaction	a change where new substances are made
irreversible change	when a change cannot be undone to get the same substances back again

Working Scientifically:

- Using test results to make predictions to set up further comparative and fair tests.
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, and taking repeat readings when appropriate.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

SEND Core Knowledge:

Children learn about the process of dissolving and explore the difference between soluble and insoluble substances. By the end of this step, children should know that a soluble substance can dissolve in a liquid to make a solution. Two examples of soluble substances are salt and sugar. Insoluble substances cannot dissolve in a liquid. Two examples of insoluble substances are sand and flour. Children should be aware that increasing the temperature of a liquid and stirring it will increase the rate at which soluble substances dissolve in it.

Common Misconceptions:

- Children may think that when a substance dissolves in water it disappears. However, soluble substances are added to liquids to make a solution. • Children may confuse dissolving with melting. When a substance dissolves, the solid is added to the liquid to make a solution, as opposed to melting, which is when a solid changes state to a liquid.
- Children may think that filtering and sieving are the same thing. Completing simple tests will help children to notice the differences.
- Children may think that the liquid disappears when it evaporates. Clarify that the liquid has changed state to a gas, which is not visible.
- Children may think that all changes are reversible. • Children may confuse dissolving with melting. When a substance dissolves, the solid mixes with the liquid to make a solution. Melting is a change of state from a solid to a liquid
- Children may think that changing state produces a new substance.

Cross Curricular Links

Possible Texts The BFG (Roald Dahl)

Possible Practical Activities:

Dissolving

In groups, children can attempt to dissolve different substances in water, such as salt, sand, rice, flour, coffee and sugar. This is to determine which substances are soluble and which are insoluble. This could be extended to investigate how we can speed up the rate of dissolving. Children could repeat this activity by using cold and warm water or stirring the liquid, to see if the different conditions affect the rate that the substance dissolves.



Separate materials

In groups, children could try to separate a variety of different mixtures by sieving, such as rice and flour, different-sized stones, or gravel, sand and larger rocks.



- This can be repeated using filtering. Children should discuss the ways that the different mixtures can be separated, and which method was more successful for each mixture. They can predict what other mixtures could be sieved and filtered.

Solutions and evaporating

- Mix a quarter of a teaspoon of salt with a tablespoon of warm water. Dissolve the salt in the water to form a solution. Transfer this solution into a Petri dish or other shallow container. Ask children to predict whether the salt can be separated from the water. Leave the container on a hot radiator or use a hairdryer on a medium setting to heat the surface of the water. Once the water has evaporated, there should be salt crystals left in the container. Ensure the solution is observed at regular intervals to prevent overheating or excess drying.

Reversible changes

In small groups, children attempt to reverse a number of different changes. These could include freezing water into an ice cube, dissolving salt in water and mixing rice with gravel and stones. Ensure children have access to sieves with different sized holes. Encourage children to notice that all of these changes can be reversed because you can retrieve the substances that you started with.



Irreversible Changes



- Children should observe a variety of different irreversible changes, such as burning a piece of toast, burning the wick of a candle or burning a match. Heating water could be included to offer comparison between heating and burning. Encourage children to discuss the difference between heating water and burning a piece of toast.