

## Science | WPC | 2020-21 | Properties and Changes of Materials

1. Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
2. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
3. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
4. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
5. Demonstrate that dissolving, mixing and changes of state are reversible changes
6. 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

	Assessment guidance	Key learning	Key vocabulary
Properties and changes of materials	Shows understanding of a concept using scientific vocabulary correctly	<p>Materials have different uses depending on their properties and state (liquid, solid, gas).</p> <p>Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets.</p> <p>Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.</p> <p>Mixtures can be separated by filtering, sieving and evaporation.</p> <p>Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.</p>	<p>Thermal/electrical insulator/conductor</p> <p>Change of state</p> <p>Mixture</p> <p>Dissolve</p> <p>Solution</p> <p>Soluble</p> <p>Insoluble</p> <p>Filter</p> <p>Sieve</p> <p>Reversible/irreversible change</p> <p>Burning</p> <p>Rusting</p> <p>Property</p> <p>Substance / material</p>
	Applying knowledge in familiar related contexts, including a range of enquiries	<p>Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat.</p> <p>Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate.</p> <p>Investigate rates of dissolving by carrying out comparative and fair test.</p> <p>Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture.</p> <p>Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning.</p> <p>Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?</p> <p>Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton).</p>	

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Lesson Progression	
1	Know that some materials will dissolve in a liquid to form a solution. Describe how to recover a substance from a solution using evaporation and that this separation is possible because dissolving is a reversible change.
2	Understand that some changes of state (gas, liquid, and solid) and dissolving and mixing processes can be reversed because they are reversible changes. Know that evaporation can be used to separate soluble materials from water. Know that filtering and sieving can be used to separate insoluble materials from water. Conduct practical experiments to explore how best to separate different mixtures using sieves and filters.
3	Explain that some changes form new materials, and that these changes are not usually reversible – they are irreversible changes. Conduct practical experiments to mix together different substances, make observations and explain what new material has been produced to make an irreversible change.
4	Explain that some changes, caused by heating or cooling, form new materials and that these changes are often not reversible. Explain that some materials change state when they are heated or cooled (e.g. water through evaporation and condensation) and that this change of state is reversible.
5	Explain that changes caused by burning form new materials and that these changes are not reversible. Give examples of new materials that are formed through burning. Conduct practical experiments and make observations to support understanding. Identify and assess hazards associated with burning materials.
6	Describe everyday materials on the basis of their properties (e.g. flexibility, solubility, conductivity, magnetism, transparency). Compare and group together everyday materials on the basis of their properties. Explain why some everyday materials are useful (and suited to their jobs) due to their properties.
7	Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials.