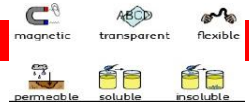
Hurst Hill Primary School Knowledge Organiser

Hurst Hill Primary School
Learning Together

Science	Properties and changes to materials	Year 5	Summer 2	Chemistry

Knowledge



A range of different materials that we learn about and use in scientific experiments can be classified (or grouped) using their properties. Some examples are listed here:

Which of these materials would be best to use as a blackout blind in a baby's room?	**Identifying and Classifying**  a selection of materials with varying degrees of transparency to investigate this question. Prior learning about light tells us that an object's transparency depends on the type of material it is made from: opaque materials block light so that we can neither see through them nor shine a light through them, translucent materials allow some light to pass through, whilst transparent materials allow light to travel through them freely. How much transparency would you need in a baby's room? Why?
Which materials can we use in a circuit to give us the brightest bulb?	**Pattern Seeking** Electrical conductors allow electricity to pass through them easily, while electric insulators do not. Electrical insulators have a high resistance, which means that it is hard for electricity to pass through these objects. Using your prior learning on electricity, what sort of materials would be good conductors of electricity? Why?  electrical insulator  electrical conductor
Which materials would be most effective for making a warm jacket?	**Comparative Testing** Materials which are good thermal conductors allow heat to move through them easily, such as a saucepan, which needs heat to travel through it in order to be able to cook food. Thermal insulators do not let heat travel through them easily, with good examples being woollen clothes and flasks for hot drinks. Using this information, do you need to make a thermal conductor or a thermal insulator? Why? Apart from wool, what other materials could you investigate? What are the reasons for your choices?  thermal insulator  thermal conductor Imagine I had some water and some beakers to investigate this question with: what other equipment would I need? What other variables would I have to consider to ensure I was carrying out a fair test? How would I record my results?
Which type of sugar dissolves the fastest? What happens to the rate of dissolving if we change the temperature of the water?	**Comparative Testing** Dissolving takes place when the particles of a solid mix with the particles of a liquid, creating a solution. Materials that are capable of dissolving, such as sugar, are soluble, whilst materials that do not dissolve are insoluble. Using this information, what do you predict will happen in your investigation? Why? What variables will you have to consider to make your testing fair?
Is melting the same as dissolving?	**Identifying and Classifying** When an object is melted, it changes from a solid state to a liquid state through heating. The object's particles begin to spread out and allow the object to flow, but otherwise the particles are unchanged. When an object is dissolved, it also changes state, but it is mixed with another object to create a new solution.
When does filtering work but not sieving to separate substances?	**Identifying and Classifying** Sieving allows you to separate the particles in two solid objects that are different sizes, such as sand and salt: the smaller particles will pass through the holes in the sieve whilst the larger particles will be held. Filtration, however, allows you to separate solid and liquid particles from each other. Can you think of any examples where filtration might be the best way to separate substances? Can you think of any other solids that could be separated using a sieve?
Can we reverse all reactions? Which ones can we reverse and which ones can't we reverse?	**Pattern Seeking** Some materials can be separated after they have been mixed based on their properties – this is called a reversible change. When a mixture cannot be separated back into the original components, this is called an irreversible change. Examples of this include when materials are burnt or when you mix bicarbonate of soda and vinegar. All of these changes are either physical (the appearance or form changes) or chemical (the matter changes and a substance with new properties is formed).
Can we classify all reversible reactions as evaporating, filtering, sieving, melting or dissolving?	**Identifying and Classifying** There are experiments that can be undertaken that will prove all of these methods of separation are useful for reversing reactions. For example, filtration will reverse the reaction between two insoluble substances, whilst the water cycle is the natural process of continually evaporating and condensing the water on the surface of the Earth. However, are these changes always reversible: for instance, can all objects that are melted be cooled and returned to their original state? Similarly, are these methods of separation the only ones that can be used to reverse a reaction? Based on your learning from previous year groups, what other properties of materials might also allow for reversible change to take place?
How does a nail in salt water change over time?	**Observing Over Time** Most nails are made of iron, which begins to corrode and rust when it is exposed to oxygen and water. The presence of salt in the water means that the process of rusting speeds up. Is there an investigation that could be done to see how quickly the process occurs in salt water compared to in a different kind of environment? What sort of differences would you expect to see? Why?
What impact have chemical changes had on our lives?	**Ideas Over Time** Without chemical changes between different materials, the way we live could be very different. For example, cooking requires a chemical change to take place for some raw foods to become cooked and edible. Similarly, batteries create electricity through a chemical change, which allows us to use a variety of different electrical devices. Can you think of any other chemical changes that are important for helping us to live our lives?
How did Ruth Benerito revolutionise the cotton industry?	**Research** Ruth R. Benerito (1916-2013) https://www.youtube.com/watch?v=UtSdDv-m0E8 American chemist and inventor.

Vocabulary

Circuit	A complete route which an electric current can flow around.
Condensation	Small drops of water which form when water vapour or steam touches a cold surface, such as a window.
Conductor	A substance that heat or **electricity** can pass through or along.
Dissolves	When a substance is mixed with a **liquid** and the substance disappears.
Electricity	A form of energy that can be carried by wires and used for heating, lighting and to provide power for devices.
Evaporation	To turn from a **liquid** to a **gas** and pass away in the form of vapour.
Filtering	A device to remove dirt or other **solids** from **liquids** or **gases**. A filter can be made from paper, charcoal or other material with tiny holes in it.
Flexible	An object or material can be bent easily without breaking.
Gas	A form of matter that is neither **liquid** nor **solid**. A **gas** rapidly spreads out when it is warmed and contracts when it is cooled.
Insoluble	Impossible to **dissolve**, especially in certain **liquids**.
Insulator	A non-**conductor** of **electricity** or heat.
Irreversible	Impossible to reverse, turn back or change.
Liquid	In a form that flows easily and is neither a **solid** nor a **gas**.
Magnetic	Having to do with magnets and the way they work.
Melting	To change from a **solid** to a **liquid state** through heat or pressure.
Particles	A tiny amount or a small piece of something.
Permeable	A substance that either a **gas** or **liquid** can pass through.
Process	A series of actions used to produce something or reach a goal.
Properties	The ways in which an object behaves.
Rate	The speed with which something happens.
Resistance	The opposing power of one force against another.
Reversible	Able to turn or change back.
Solid	Having a firm shape or form that can be measured in length, width and height, and not like a **liquid** or **gas**.
Soluble	Able to be **dissolved**.
Solution	A mixture that contains two or more substances that are combined evenly.
State	The structure or condition of something.
Temperature	A measure of how hot or cold something is.
Thermal	Relating to, or caused by, heat or by changes in **temperature**.
Transparent	An object that can be seen through.
Variable	Something that can change or that has no fixed value.
Water cycle	The **process** by which water on the earth **evaporates**, **condenses** in the atmosphere and then returns to the earth in the form of precipitation.

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Chemistry is the science that deals with the composition and properties of substances and various elementary forms of matter.

Statutory requirements

Pupils should be taught to:

- 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
- 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
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- 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