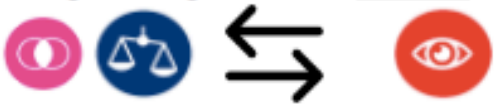
TMS Science Launchpad - Year 2023/2024
Year 5 - Chemistry: Properties and changes of materials

Substantive knowledge:

Materials **change state** by **heating and cooling** *(link to previous learning about water cycle etc)*
Dissolving, mixing and changes of state are **reversible changes**



Some changes result in the formation of new materials, and this kind of change is usually not reversible.
Sometimes mixed substances react to make a new substance *(the action of acid on bicarbonate of soda)* These changes are usually **irreversible.**

Heating can sometimes cause materials to change permanently. *(changes associated with burning)* When this happens, a new substance is made *(wood to charcoal)* These changes are irreversible.
Indicators that something new has been made are:

- The properties of the material are different (colour, state, texture, hardness, smell, temperature)
- If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)

Mixtures can be separated using different methods depending on whether they are **soluble** or **insoluble.**

Some solid materials are soluble and will **dissolve** in liquid it will form a **solution**.
Sometimes a **substance** can be recovered from a **solution** through **evaporation** (eg sugar or salt in water)

When two or more substances are mixed and remain present (a mixture of different sized solids or an insoluble solid and a liquid) the mixture can be separated using sieving (sand and soil), filtering (tea leaves and tea), floating (oil and water) or using magnets (iron pieces in sand).

Everyday materials can be grouped and compared according to their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.

Vocabulary:
solid, liquid, gas, particles (*NB - this is a useful term but children do not need to know it by the end of this learning)* state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, hardness, solubility, transparency, conductivity, magnetic, filter, evaporation, dissolving, mixing material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversible, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.

Disciplinary knowledge

Comparative tests	Observation over time	Identify and classify	Pattern seeking	Identify and classify	Identify and classify
How does the temperature of water affect how long it takes for a sugar cube to dissolve? (gather/record results)	How does a container of salt water change over time? (make a prediction)	Can you identify the best methods to separate mixtures? (interpret results and draw conclusions)	How does the amount of bicarbonate of soda, washing up liquid and vinegar affect the reaction? (gather/record results)	Can you identify and classify these reactions and changes into reversible, and irreversible? Describe similarities and differences. (observe closely)	How can different materials be grouped according to their properties? (to ask scientific questions)

Research

What are microplastics and why are they harming the planet?
What are smart materials and how can they help us?