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**Knowledge Rich Curriculum Plan**

SCIENCE- Chemical Changes



| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Prior Knowledge:**  *In order to know this, students need to already know that…* | **Working Scientifically** | **Tiered Vocabulary and Reading Activity** | **Assessment** | **Support** |
| --- | --- | --- | --- | --- | --- | --- |
| **01 Physical and chemical changes** | *Physical changes are easily reversed, such as the changes of state. Physical changes can be used to separate substances for example; distillation. Chemical changes are reactions where new materials are made and cannot be easily reversed. For example; the burning of wood. Chemical changes can be observed by; a temperature changes, a colour change, a gas produced and a new substance forming. Students will be able to conduct a practical experiment to determine if a physical or chemical change occurs.* | *Students need to know about the structure of solids, liquids and gases. Students need to know the particle model for solids, liquids and gases. Changes of state between solids, liquids and gases and melting point/boiling point.* | *Interpreting data from a graph*  *Calculating changes in temperature* | ***Physical properties -*** *characteristics that can be observed or measured without changing the composition of a substance.*  ***Chemical properties -*** *characteristics that give it the ability (or inability) to undergo a change in composition.*  ***Reversible -*** *capable of being reversed so that the previous state or situation is restored.*  ***Irreversible -*** *not able to be undone or altered.* | Retrieval questions  Simple exam questions  Homework quiz 1  End of topic test  Summative assessment 3 | <https://www.bbc.co.uk/bitesize/guides/zw6jh39/revision/3>  <https://www.bbc.co.uk/bitesize/guides/zc9q7ty/revision/1>  Knowledge organiser (provided on Teams and in class) |
| **02**  **Reactivity Series** | *Students will know the order of the reactivity of metals on the reactivity series; potassium sodium, lithium, calcium, magnesium, zinc, iron, copper. Students will know the definition of a displacement reaction 'the more reactive element replaces the less reactive element in a compound'* | *Students need to already know that elements can be categorised into metals and non-metals. Students need to already know that some substances are more reactive than others.* | *Observing changes in a chemical reaction.* | *Tendency means there is a strong chance that something will happen in a particular way*  *Displacement reactions are when a more reactive metal can displace a less reactive metal from a compound* | Retrieval questions  Simple exam questions  Homework quiz 1  End of topic test  Summative assessment 3 | <https://www.bbc.co.uk/bitesize/guides/zqjsgk7/revision/1>  <https://www.youtube.com/watch?v=L4DUGgfNqpE>  Knowledge organiser (provided on Teams and in class) |
| **03**  **Displacement Reactions** | *Students will be able to plan and conduct a practical experiment to observe the changes in the appearance of different metals when added to a variety of metal compound solutions. Students will be able to determine the reactivity of the metals within the experiment* | *Students will already know the definition of a displacement reaction and how to safely perform a practical experiment* | *Identifying variables*  *Using safety precautions to show good laboratory practice.*  *Designing a suitable table to record results.* | *Variables- any factor that can be manipulated, controlled for, or measured in an experiment.*  *Appearance- the act of becoming visible to the eye* | *Retrieval questions*  *Simple exam questions*  *Homework quiz 1*  *End of topic test*  *Summative assessment 3* | [*https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/z9sptrd*](https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/z9sptrd)  [*https://www.youtube.com/watch?v=7Pm5-ox6YGM*](https://www.youtube.com/watch?v=7Pm5-ox6YGM)  Knowledge organiser (provided on Teams and in class) |
| **04**  **What is a precipitate?** | *Students will know that substances that are insoluble form precipitates in solutions. A precipitate is a solid forming in a solution. The more insoluble the substance the more precipitate will form. Students will conduct an experiment to determine the formation of precipitates in different solutions.* | *Students need to already know the definitions of soluble, insoluble and solution.* | *Using safety precautions to show good laboratory practice.*  *Recording observations in table*  *Draw conclusions based on findings.* | *Insoluble- incapable of being dissolved*  *Precipitate- a substance to be deposited in solid form from a solution.*  *Accumulates: to build up* | *Retrieval questions*  *Simple exam questions*  *Homework quiz 2*  *End of topic test*  *Summative assessment 3* | [*https://www.bbc.co.uk/bitesize/guides/zx6csrd/revision/4*](https://www.bbc.co.uk/bitesize/guides/zx6csrd/revision/4)  Knowledge organiser (provided on Teams and in class) |
| **05**  **Conservation of Mass** | *Students will know be able to state that the conservation of mass is no atoms are created or destroyed in a chemical reaction, only changed. Students will know what is meant by a closed system, nothing can be added or removed. In an open system, reactants/products can be added or removed.* | *Students will already know the definition of ‘conservation’ is. Students already know that reactants are on the left-hand side of the reaction and products are on the right. Students already know the difference between a chemical and physical reaction.* | *Recording results in a table*  *Measuring mass using a top-pan balance*  *Plotting data in a graph* | *Reactant: a substance that takes part in and undergoes change during a reaction.*  *Product: The substance formed from a chemical reaction* | *Retrieval questions*  *Simple exam questions*  *Homework quiz 2*  *End of topic test*  *Summative assessment 3* | [*https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/zxh7jsg*](https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/zxh7jsg)  Knowledge organiser (provided on Teams and in class) |
| **06**  **Why do things burn?** | *Students will know that burning requires oxygen. Students will know how to recognise that burning of a metal involves combination with oxygen. For example; magnesium + oxygen 🡪 magnesium oxide*  *Students will make predictions about the changes in mass before and after the reaction with oxygen.* | *Students will know that burning releases thermal energy. Students will know that some objects are more flammable than others.* | *Enquire: Plan an investigation and predict outcomes.* | *Ore- a naturally occurring solid material from which a metal or valuable mineral can be extracted profitably.*  *Compound- made from 2 or more chemical elements combined to make a new substance.*  *Concentration- The concentration of a solution is a measure of how 'crowded' the solute particles are. The more concentrated the solution, the more particles it contains in a given volume*  *Extraction- to separate a desired substance when it is mixed with others.*  *Purification- the removal of contaminants from something.*  *Mined- Obtain from a mine.*  *Profitable- financial gain.* | *Retrieval questions*  *Simple exam questions*  *Homework quiz 2*  *End of topic test*  *Summative assessment 3* | [*https://www.bbc.co.uk/bitesize/guides/zxgkp39/revision/2#:~:text=Many%20metals%20and%20non%2Dmetals,oxides%20and%20non%2Dmetal%20oxides*](https://www.bbc.co.uk/bitesize/guides/zxgkp39/revision/2#:~:text=Many%20metals%20and%20non%2Dmetals,oxides%20and%20non%2Dmetal%20oxides)*.*  Knowledge organiser (provided on Teams and in class) |
| **07**  **Magnesium oxide practical** | *Students will be able to predict the outcome of the magnesium oxide practical. Students will be able to identify variables in experiment. Students will be able to identify the difference between an open and a closed system. Open system is when energy or matter can be exchanged in and out of the system, which can lead to a change in mass. A closed system is when no energy or matter is able to be exchanged so there is no change in mass.* | *Students will know that metals + oxygen 🡪 metal oxides* | *Analyse: Draw conclusions from the experiment.* | *Open system: a system that allows substances in and out*  *Closed system: a system that allows no substances in or out* | *Retrieval questions*  *Simple exam questions*  *Homework quiz 3*  *End of topic test*  *Summative assessment 3* | Knowledge organiser (provided on Teams and in class)  [*https://www.youtube.com/watch?v=R9bUO70UfN8*](https://www.youtube.com/watch?v=R9bUO70UfN8)  [*https://www.bbc.co.uk/bitesize/guides/zxgkp39/revision/2*](https://www.bbc.co.uk/bitesize/guides/zxgkp39/revision/2) |
| **08 Combustion** | *Students will know that complete combustion occurs when plenty of oxygen is available, the products of complete combustion to be carbon dioxide and water. Incomplete combustion occurs when there is a lack of oxygen, The products of incomplete combustion to be carbon, carbon monoxide and water. Students will be able to describe the test for the presence of carbon dioxide to be the limewater test. A positive result shows a cloudy solution. A negative result means that the limewater will remain colourless. Fuel sources include the hydrocarbons alkanes and alkene. Alkanes contain single bonds only, they are saturated. Whereas alkenes contain single and double bonds, they are unsaturated.* | *Students will know that burning is an irreversible change and it requires oxygen.* |  | *Combustion: Rapid reaction of a substance with oxygen*  *Fuel: Material that is burned to produce heat or power*  *Hydrocarbon: compound that contains carbon and hydrogen only* | *Retrieval questions*  *Simple exam questions*  *Homework quiz 3*  *End of topic test*  *Summative assessment 3* | <https://www.bbc.co.uk/bitesize/guides/zx6sdmn/revision/1>  <https://www.youtube.com/watch?v=agfD0P501tw>  Knowledge organiser (provided on Teams and in class) |
| **Optional Practical Lesson** | *Students will learn that one way of increasing the rate of reaction is to increase the surface area of one of the reactants*  *Students will follow a step by step method.*  *Students will identify independent, dependent and control variables*  *Students will design a suitable results table and record data correctly* | *Students will know that a colour change indicates that a chemical reaction has occurred*  *Students will know how to use a measuring cylinder, stop watch*  *Students will know that rhubarb is a vegetable*  *Students will know that some acids are toxic*  *Students will know that reactants react together to make products* | *Taking measurements*  *Recording data*  *Following a method* | *Hazard: Something that has a potential to cause harm* | *Summative assessment 3*  *Transferable Practical skills* | N/A |