

Topic 3 - Reactions 3

What's the science story?

Chemical reactions are how new forms of matter are made. While nuclear reactions also may produce new matter, nearly all the substances you encounter in daily life are the result of chemical changes. Chemical reactions help us understand the properties of matter.



Previous knowledge:

KS2

Reactions – Chemical vs physical

KS3

Reactions 1 and 2

Next steps...

KS4

C1 – Atomic structure &

PT

C4 – Chemical changes

C5 – Energy changes

C10 – Using resources



Keywords

Thermal
Decomposition
Combustion
Chemical
Physical

Reactivity
Alkali
Hydroxide
Equation
Salt
Oxidation
Polymers

Reactants
Products
Endothermic
Exothermic
Ore
Ceramics
Composites



Lesson No. and Title	Learning objectives	Skills	Practical equipment
1. Chemical reactions	ARE – Describe what thermal decomposition and combustion are. AGD – Compare decomposition reactions with combustion.	WS8 – Working with a method WS10 – Using equipment correctly.	DEMO – Thermal decomposition of copper carbonate PRAC – Decomposition of other metal carbonates. Metal carbonate samples, test tubes, bungs with side arms, limewater
2. Metals with water	ARE – Plan and run a practical to compare the reactivity of three metals. AGD – Suggest metals for particular jobs based on suitability.	WS8 – Working with a method WS9 - Variables	DEMO – Alkali metals with water PRAC – Metals reactivity 3 metals, test tubes
3. Metals with acids	ARE – Predict names of products formed in metal and acid reactions. AGD – Suggest how temperature changes may be linked with reactivity.	WS3 – Make predictions	DEMO – Test for hydrogen PRAC – Metals reactivity with acid Magnesium, zinc, iron, hydrochloric acid, test tubes, measuring cylinders
4. Metals with oxygen	ARE – Calculate masses of reactants and products and predict products of oxidation reactions. AGD – Apply conservation of mass to different situations.	WS10 – Using equipment correctly.	PRAC – Oxidation of magnesium Magnesium ribbon, balances, crucibles, tongs
5. Balancing equations	ARE – Use state symbols in balanced formula equations. AGD – To write balanced formula equations.		

Assessment 1: Metals and acids

<p>6. Endothermic and Exothermic</p>	<p>ARE – Describe the characteristics of exothermic and endothermic changes. AGD – Apply temperature changes to predict the type of reaction.</p>		<p>PRAC – Endo or exo Potassium chloride, citric acid, sodium hydrogen carbonate, hydrochloric acid, sodium hydroxide, magnesium ribbon, test tubes, 250ml beaker, measuring cylinder, thermometer</p>
<p>7. Extraction</p>	<p>ARE – Use reactivity series to predict reduction reactions. AGD – Explain why metals can be extracted using carbon, using the idea of displacement.</p>	<p>WS8 – Working with a method</p>	<p>PRAC – Reducing copper oxide Copper (II) oxide, charcoal powder, test tubes, spatulas</p>
<p>Assessment 2: Displacement reactions</p>			
<p>8. Metals in Ores</p>	<p>ARE – Model how metal ores are mined. AGD - Convert amounts of metals within ores from masses to percentages, or vice versa.</p>	<p>WS16 – Using equations</p>	<p>PRAC – Cookie mining Cookies, tweezers, paper towels</p>
<p>9. Ceramics, Polymers & Composites</p>	<p>ARE – Explain properties of ceramics, polymers and composites. AGD – Suggest advantages and disadvantages of each.</p>		

Assessment Criteria

Assessment No. & Title	Working Towards	Age Related Expectations	At Greater Depth
n/a	State simply what a decomposition reaction is	Use a pattern to predict products of decomposition reactions	Write balanced formula equations for decomposition reactions
1. Metals and acids	State the products of the reaction between metals and water	Describe observations of a chemical reaction.	Compare the observations of different metals in water and link to reactivity
	Describe what happens when metals react with acids.	Explain the test for hydrogen gas	Use word and formula equations to explain the test for hydrogen gas
n/a	State the product of the reaction between metals and oxygen	Construct word equations to represent reactions with metals and oxygen	Write balanced formula equations for reactions between metals and oxygen
n/a	Predict products of combustion reactions	Construct balanced formula equation for some combustion reactions.	Compare decomposition reactions with combustion reactions
n/a	State that mass is conserved in a chemical reaction	Calculate masses of reactants and products.	Apply the conservation of mass in unfamiliar situations, giving a reasoned explanation.
n/a	Identify a reaction as endothermic and exothermic	Describe the characteristics of exothermic and endothermic changes	Apply temperature changes to exothermic and endothermic changes in unfamiliar situations
n/a	Identify state symbols from an equation.	Use state symbols in balanced formula equations	Construct balanced equations that include state symbols
2. Displacement	State where different metals are found in the reactivity series	Use the reactivity series to predict reactions	Link a metal's reaction with its place in the reactivity series.
	Define a displacement reaction	Use the reactivity series to explain displacement reactions.	Use particle models and diagrams to represent displacement reactions
n/a	Define a reduction reaction	Use the reactivity series to decide which metals can be extracted from their ores by heating with carbon	
n/a	State some uses of composite materials	Describe why composite properties make them suitable for their uses.	
n/a	State some uses of polymers	Describe how polymer properties make them suitable for their uses	Distinguish between chemical and physical properties of ceramics
n/a	List the properties and uses of ceramics	Describe why properties of ceramics make them suitable for their uses	Suggest advantages and disadvantages of composite properties