

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

Working scientifically skills:

WS3 – Make predictions
WS8 – Working with a method
WS9 - Variables
WS10 – Using equipment correctly.
WS16 – Using equations

Key Skills:

New vocabulary introduced
Discussions

Reading given texts
Concluding - deducting

Assessments:

Exit tickets x 2

ET 1 – Metals and acids

ET 2 – Carbonates and oxides

KS3 – Year 8

Assessment grid

Working Towards		Age Related Expectations		At Greater Depth	
State simply what a decomposition reaction is		Predict products of combustion reactions		Construct balanced formula equation for some combustion reactions.	
State that mass is conserved in a chemical reaction		Categorise oxidation reactions as useful or not		Write balanced formula equations for decomposition reactions	
Identify a reaction as endothermic and exothermic		Use a pattern to predict products of decomposition reactions		Compare decomposition reactions with combustion reactions	
Describe what happens when metals react with acids.		Calculate masses of reactants and products.		Apply the conservation of mass in unfamiliar situations, giving a reasoned explanation.	
Identify state symbols from an equation.		Describe the characteristics of exothermic and endothermic changes		Predict and explain whether the mass within a reaction vessel will stay the same from word and formula equations.	
State the product of the reaction between metals and oxygen		Explain the test for hydrogen gas		Apply temperature changes to exothermic and endothermic changes in unfamiliar situations	
State the products of the reaction between metals and water		Use state symbols in balanced formula equations		Use word and formula equations to explain the test for hydrogen gas	
State where different metals are found in the reactivity series		Use the reactivity series to predict reactions		Construct balanced equations that include state symbols	
Calculate the percentage of waste material in a metal ore.		Use the reactivity series to explain displacement reactions.		Link a metal's reaction with its place in the reactivity series.	
List the properties and uses of ceramics		Use the reactivity series to decide which metals can be extracted from their ores by heating with carbon		Use particle models and diagrams to represent displacement reactions	
State some uses of polymers		Calculate the amounts of metals in ores		Explain why metals can be extracted using carbon, using the idea of displacement	
State some uses of composite materials		Explain why properties of ceramics make them suitable for their uses		Convert amounts of metals within ores from masses to percentages, or vice versa.	
		Explain how polymer properties make them suitable for their uses		Distinguish between chemical and physical properties of ceramics	
		Explain why composite properties make them suitable for their uses.		Suggest advantages and disadvantages of composite properties	

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 <i>ET 1 – Metals & acids</i>	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 <i>ET 2 – Carbonates & Oxides</i>	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.		
6. Endothermic and Exothermic	ARE – Describe the characteristics of exothermic and endothermic changes. AGD – Apply temperature changes to predict the type of reaction.		PRAC – Endo or exo Potassium chloride, citric acid, sodium hydrogen carbonate, hydrochloric acid, sodium hydroxide, magnesium ribbon, test tubes, 250ml beaker, measuring cylinder, thermometer

KS3 – Year 8

7. Extraction	ARE – Use reactivity series to predict reduction reactions. AGD – Explain why metals can be extracted using carbon, using the idea of displacement.	WS8 – Working with a method	PRAC – Reducing copper oxide Copper (II) oxide, charcoal powder, test tubes, spatulas
8. Metals in Ores	ARE – Model how metal ores are mined. AGD - Convert amounts of metals within ores from masses to percentages, or vice versa.	WS16 – Using equations	PRAC – Cookie mining Cookies, tweezers, paper towels
9. Ceramics, Polymers & Composites	ARE – Explain properties of ceramics, polymers and composites. AGD – Suggest advantages and disadvantages of each.		