KS3 – Year 8

Topic 4: Reactions 2

What's the science story?

This topic follows on from Reactions 1 and Particles in year 7. As well as continuing to model the behaviour of substances using the term 'particle' they develop the idea of atoms and elements, mainly through learning about the Periodic Table. This also provides the context for revisiting learning on chemical reactions during year 7.

Previous knowledge:

Y7 Reactions 1

Pure and impure substances

- the concept of a pure substance
- mixtures, including dissolving
- diffusion in terms of the particle model
- simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography
- the identification of pure substances

Chemical reactions

- chemical reactions as the rearrangement of atoms
- representing chemical reactions using formulae and using equations
- defining acids and alkalis in terms of neutralisation reactions
- the pH scale for measuring acidity/alkalinity; and indicators
- reactions of acids with metals to produce a salt plus hydrogen
- reactions of acids with alkalis to produce a salt plus water

y7 Particles

The particulate nature of matter

- the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure
- changes of state in terms of the particle model

Energetics

- energy changes on changes of state (qualitative)

Next steps…

Y9 reactions 3

Atoms, elements and compounds

- conservation of mass changes of state and chemical reactions

Chemical reactions

- chemical reactions as the rearrangement of atoms
- representing chemical reactions using formulae and using equations
- combustion, thermal decomposition, oxidation and displacement reactions

Energetics

- exothermic and endothermic chemical reactions (qualitative)

Materials

- the order of metals and carbon in the reactivity series
- the use of carbon in obtaining metals from metal oxides
- properties of ceramics, polymers and composites (qualitative)

Keywords:

Atom
Element
Particle diagrams
Model
Property
Trends
Symbol
Name
Hazard
Displacement
Noble
Unreactive
Inert
Compound
Property
Mixture
Molecule
Chemical
Physical
Particles
Formula
Patterns
Reaction
Oxygen
Melting point
Shiny
Conductor
Malleable
Ductile
Reactivity
Brittle
Metal
Non-metal
Physical
Periodic table
Groups
Periods

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Lesson No. and Title	Learning objectives - Knowledge	National Curriculum	Working scientifically skills	Practical equipment
1. Atoms	ARE - State what atoms are AGD - Link the behaviour of atoms within substances to explain why elements exhibit certain properties.	**Atoms, elements and compounds** • a simple (Dalton) atomic model		
2. Elements	ARE - State what an element is. AGD - Explain why certain elements have specific uses in terms of their properties	• differences between atoms, elements and compounds • the varying physical and chemical properties of different elements		
3. Compounds	ARE - State what a compound is. AGD - Differentiate elements from compounds when given names and properties.	• differences between atoms, elements and compounds • the varying physical and chemical properties of different elements		see activate sheet 5.3.3 PRAC compounds

4. Chemical formulae	ARE - Write the chemical names and formulae for some simple compounds AGD - Differentiate elements from compounds when given names and properties.	• chemical symbols and formulae for elements and compounds		
Assessment 1: Chemical compounds				
5. Metals and non-metals	ARE - Use patterns to classify an element as a metal or non-metal AGD - Explain how the position of an element can be used to suggest properties of elements	• the varying physical and chemical properties of different elements • the periodic table: periods and groups; metals and non-metals • the properties of metals and non-metals		powerpoint practical instructions printed off battery, bulb, 2 wires with plug and croc clip torch beaker, kettle hammer dil HCl, 2 x dropping tile, 2 x pipette copper chloride soln
6.Periodic Table	ARE - Compare patterns in properties in the groups and periods of the Periodic Table and use them to make predictions. AGD - Predict the properties of an element, given its position on the Periodic Table	• the varying physical and chemical properties of different elements • the principles underpinning the Mendeleev periodic table • the periodic table: periods and groups; metals and non-metals • how patterns in reactions can be predicted with reference to the periodic table		
Assessment 2: The periodic table				

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7. Group 1	ARE - Use patterns to predict properties of Group 1 elements. AGD - Describe patterns in the properties of Group 1 elements using data given.	• the varying physical and chemical properties of different elements • how patterns in reactions can be predicted with reference to the periodic table		Demo group 1 metals, trough, scalpel, test tube, gloves, tile, UI solution
8. Group 7	ARE - Use patterns to predict properties of Group 7 elements. AGD - Describe patterns in the properties of Group 7 elements using data given.	• the varying physical and chemical properties of different elements • how patterns in reactions can be predicted with reference to the periodic table • displacement reactions		Demo displacement of halogens 0.1% solutions of chlorine water, bromine water, and iodine water 0.1M solutions of potassium chloride, potassium bromide, and potassium iodide test tubes
9. Group 0	ARE - Use patterns to predict properties of Group 0 elements. AGD - Describe patterns in the properties of Group 0 elements using data given.	• the varying physical and chemical properties of different elements • how patterns in reactions can be predicted with reference to the periodic table		Demo balloons of H and He
Assessment 3: Group 1 metals				

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10. Identifying unknown substances	ARE – To represent elements and compounds with particle diagrams. AGD – To compare a range of different substances.	• the varying physical and chemical properties of different elements • how patterns in reactions can be predicted with reference to the periodic table		
11. Atoms in chemical reactions	ARE - Write word equations to represent chemical reactions. AGD - Convert word equations into balanced formula equations.	**Chemical reactions** • chemical reactions as the rearrangement of atoms • representing chemical reactions using formulae and using equations		2 demos: Whoosh bottle Burning magnesium ribbon (blue glass needed to watch demo)

Assessment Criteria (part 1)

Assessment No. & Title	Working Towards	Age Related Expectations	At Greater Depth
n/a	State examples of elements.	State what an element is.	Explain why certain elements have specific uses in terms of their properties
	Identify substances that are elements, giving a simple reason for my answer	Recall the chemical symbols of six elements	Link the behaviour of atoms within substances to explain why elements exhibit certain properties.
	List the properties of some elements	State what atoms are	Use information given to draw conclusions about how the properties of atoms contribute to the properties of elements.
1. Chemical compounds	State how many different elements are in a compound by looking at a chemical formula.	State what a compound is.	Use particle diagrams to explain why a compound has different properties to the elements in it.
	Name the elements in a compound	Write the chemical names for some simple compounds.	Explain why a compound has different properties to the elements in it

Assessment Criteria (part 2)

Assessment No. & Title	Working Towards	Age Related Expectations	At Greater Depth
n/a	State some common properties of metals and non-metals	Use patterns to classify an element as a metal or non-metal	Predict the properties of an element, given its position on the Periodic Table
2. The periodic table	Describe in simple terms what pattern is shown in a given property of a group or period from a table of data or graph.	Use patterns to predict properties of elements	Explain how the position of an element can be used to suggest properties of elements
		Compare patterns in properties in the groups and periods of the Periodic Table.	Apply patterns shown within groups or periods to unknown elements.
3. Group 1 metals	State the products of the reaction between two Group 1 metals with water	Interpret data to describe patterns in properties of the Group 1 elements	Describe patterns in the properties of Group 1 elements using data given
		Use patterns to predict properties of Group 1 elements	
n/a	State a pattern shown by the Group 7 and Group 0 elements	Use patterns to predict properties of Group 7 and Group 0 elements	Link information about Group 0 elements to their properties
n/a	State simply what happens in a displacement reaction	Describe displacement reactions	Write word equations to represent displacement reactions
n/a	Complete simple word equations	Write word equations to represent chemical reactions	Convert word equations into balanced formula equations