



Year 9 Learning Journey - Autumn Term 1

KS3 – Useful Chemical Reactions

Core knowledge
1. Describe some common properties of metals.
2. Relate the uses of different metals to their physical properties.
3. Describe what a catalyst is and some uses of catalysts.
4. Name the compounds formed by a reaction between a metal and a non-metal and write word equations for these reactions.
5. Explain what is meant by 'corrosion' and 'rusting'.
6. Write word equations and interpret symbol equations for oxidation reactions.
7. Explain how metals can be protected from corrosion.
8. Describe the reactions of different metals with water and write word and symbol equations for these reactions.
9. Describe the gas test for hydrogen.
10. Place metals in order of reactivity based on their reactions with water and oxygen.
11. Key Practical Skill: Explain what is meant by 'accurate' data. Identify data as repeatable and reproducible. Identify the range of readings in an experiment. Explain how to improve the quality of data collected during an investigation.
12. State what is produced when a metal reacts with an acid and write word equations for these reactions.
13. Name the salts produced by the reactions between metals and different acids.
14. State what is meant by an 'alloy' and describe their properties.
15. Draw a diagram to model the arrangement of particles in pure metals and alloys and use this to explain the properties of alloys.
16. State what is meant by a 'pure' substance and identify pure substances by their melting and boiling points.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2 / Extend	
	Mark	RAG	Mark	RAG
LC1				
LC2				

Key Vocabulary

Tier 2

Categorise, Contrast, Accuracy, Relate, Judge

Tier 3

Metal, Acid, Rusting, Oxidation, Properties, Water



Year 9 Learning Journey - Autumn Term 1

KS3 – Chemistry of the Earth and atmosphere

Core knowledge				
1. State that the composition of the atmosphere has not changed much in the last 200 million years.				
2. Describe the composition of the atmosphere and explain how the early atmosphere was formed.				
3. Explain how the level of carbon dioxide in the atmosphere decreased and the level of nitrogen increased.				
4. Describe how crude oil and natural gas formed and that limestone and coal are both sedimentary rocks.				
5. Describe how the level of oxygen in the atmosphere increased and be able to write the equation for photosynthesis.				
6. Interpret evidence and evaluate different theories on how Earth's atmosphere evolved.				
7. Recall what a greenhouse gas is and give examples such as methane, carbon dioxide and water vapour.				
8. Describe human activities that increase the levels of greenhouse gases in the atmosphere.				
9. Describe and explain how greenhouse gases help to keep the earth warm enough for life.				
10. Explain why many scientists believe that increases in the temperature of the earth are linked to human activities and that this will cause climate change.				
11. Evaluate given evidence about climate change and describe possible uncertainties in the evidence.				
12. Be able to describe why peer review and communication of results is important.				
13. Be able to describe some of the possible consequences of climate change in terms of their scale and risk.				
14. Describe the structure and composition of the Earth.				
15. Describe different types of rocks in terms of igneous, metamorphic and sedimentary and how they are formed through the rock cycle.				
16. Describe how carbon monoxide, carbon particles (soot) and unburnt hydrocarbons can be produced when fuels are burned.				
17. Describe some of the problems associated with particulates in the air.				
18. Describe and explain why carbon monoxide is toxic and why it is difficult to detect.				
19. State that fuels such as coal may contain sulfur as well as carbon and hydrogen and describe how sulfur dioxide and nitrogen oxides can be produced when fuels are burned.				
20. Use the composition of a fuel to predict what will be produced when it is burned.				
21. Describe some of the problems caused by sulfur dioxide and oxides of nitrogen including respiratory problems and acid rain.				
Learning Checkpoint Title	Attempt 1		Attempt 2 / Extend	
	Mark	RAG	Mark	RAG
LC1				
LC2				
Key Vocabulary				
Tier 2				
Represent, Predict, Debate, Opinion, Composition, Originate				
Tier 3				
Composition, Atmosphere, Sedimentary, Photosynthesis, Climate Change, Greenhouse Gases				



Year 9 Learning Journey

Autumn Term 2

Atomic structure

Core knowledge
1. Describe the differences between atoms, elements and compounds.
2. Convert reactions into word and balanced chemical equations.
3. Label diagrams of an atom, including the subatomic particles and identify their relative masses and charges.
4. State the approximate radius of an atom and a nucleus and express these values in standard form.
5. Relate the size and scale of atoms to objects in the physical world.
6. Use the names and symbols of the first 20 elements in the periodic table and all of the elements in groups 1 and 7.
7. Calculate the numbers of protons, neutrons and electrons in an atom using the mass and atomic numbers.
8. Represent the electronic structures of the first 20 elements of the periodic table using numbers or diagrams.
9. Describe the terms ion and isotope and explain the differences between them.
10. Calculate the relative atomic mass of an element given the percentage abundance of its isotopes.
11. Describe the contribution made by scientists to develop the model of the atom and evaluate the plum pudding and nuclear models.

Learning Checkpoints

Learning Checkpoint Title	Attempt 1		Attempt 2 / Extend	
	Mark	RAG	Mark	RAG

Key Vocabulary

Tier 2

Structure, Extend, Abundant, Develop, Construct

Tier 3

Atom, Element, Compound, Equation, Nucleus, Isotope, Relative Atomic Mass



Year 9 Learning Journey - Summer Term

Structures, Bonding and the Properties of Matter

Core knowledge				
1. Describe what an ion is and how it is formed.				
2. Explain how ionic bonding occurs between oppositely charged ions.				
3. Explain ionic bonding in terms of electrostatic forces and loss and gain of electrons using dot and cross diagrams.				
4. Describe the properties of ionic compounds and explain why they conduct electricity when molten or dissolved.				
5. Describe what a covalent bond is and use diagrams to show how covalent bonds form between non-metal elements.				
6. Draw diagrams to represent the bonding in the simple molecules of hydrogen, chlorine, hydrogen chloride, methane, water, oxygen & nitrogen.				
7. Explain in terms of intermolecular forces why simple molecular substance have poor electrical conductivity, low melting and boiling points and are usually gases or liquids at room temperature.				
8. Recall that silicon dioxide, graphite and diamond are all giant covalent substances and explain why they have high melting and boiling points.				
9. Describe and explain the structure and properties of diamond, graphite and graphene.				
10. State what is meant by the term fullerene and give examples of these structures.				
11. Explain how the properties of nanotubes makes them suitable for their uses.				
12. Be able to draw diagrams of the bonding in a metal and explain how the structure gives it useful properties.				
13. State what an alloy is and use understanding of their structure to explain why they are harder than pure metals.				
14. Use diagrams and state symbols to represent the 3 states of matter and explain the limitations of each model.				
15. Recall that the bulk properties of a material aren't possessed by the particles of that material.				
16. Use the particle model to explain changes of state and describe the relationship between both melting and freezing (melting point) and boiling and condensing (boiling point).				
17. Explain the relationship between the strength of forces between particles and how much energy it takes for a substance to melt or boil and predict using data the state of a substance at a particular temperature.				
Learning Checkpoint Title	Attempt 1		Attempt 2 / Extend	
	Mark	RAG	Mark	RAG
LC1				
LC2				

Key Vocabulary				
Tier 2 Attract, Repulsive, Possess, Model, Oppose				
Tier 3 Ion, Ionic Bond, Covalent Bond, Giant Covalent Structure, States of Matter				