

Scheme of Learning: Metals & Materials

Topic Sequence:

1	2	3	4	5	6	7	8	9
Acids & Alkalis	Motion & Pressure	Photosynthesis & Respiration	Metals & Materials	Waves	Inheritance & Evolution	Earth & Atmosphere	Space	Ecosystems & Interdependence

Topic Overview:

At KS2 students should have begun to classifying materials and link material properties to their uses for some everyday substances. In this topic we cover:

- representing chemical reactions using formulae and using equations
- combustion, thermal decomposition, oxidation and displacement reactions
- reactions of acids with metals to produce a salt plus hydrogen
- 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).

Lesson Sequence:

The topic begins with three lessons looking at how different metals behave in three common reactions (with water, acid and oxygen). The results of these experiments are then used to investigate the reactivity series and displacement reactions, including the use of carbon to extract metals from their ores.

The last two lessons look at more complicated materials, covering the properties and uses of ceramics, composites and polymers.

Please note: some of the lessons may take more than the 1 hour lesson slot. Please account for this in your advanced planning.

Sequence of Lessons:

1	Metals and acids
2	Metals and oxygen
3	Metals and water
4	Reactivity and displacement
5	Reactivity and metal extraction
6	Ceramics and composites
7	Testing composites and polymers
8	Assessment

Resources:

1	Mg, Zn, Cu, Al, Fe pieces and 0.5M HCl, white boards
2	Rusty nail, new nails, oil, anhydrous calcium chloride, salt. Mg, Fe, Cu, Zn, Al pieces Balancing equations – version of ppt slide to stick in and balance
3	demo - lithium, sodium, calcium, UI, trough; Class set - Mg, Fe, Cu, Zn, Al,
4	Demo - copper wire, silver nitrate; Class set - Mg, Zn, Al, Cu and corresponding sulphates, laminated tables for experiment. Reactivity series to stick in; copy of laminated sheet for results
5	Iron oxide and carbon powder, tin lid, magnet
6	Ceramic examples - roof tiles, bricks, pottery, porcelain, bone china Making test bars: cement, sand, aggregate, giant paperclips unbent into rods, card template for former, plasticine
7	Demo - making nylon concrete bars – reinforced and unreinforced. Use a mix of 1:3:6 cement:sand:aggregate and unbent giant paperclips for the reinforced bars (or student's prepared bars from last lesson), 100g masses Class set – at least 2 types of plastic bags, hole punch/bulldog clips, Sellotape, 100g masses and hanger
8	Quiz sheet Assessment sheet

Supportive Reading:

Comprehension activity	TBC
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Assessment:

Knowledge:	20 question multiple choice quiz
Application of Knowledge:	Extended writing task evaluating the use of an energy resource