CC10: **Electrolytic Processes** (Paper 1)
CC11: **Obtaining and Using Metals** (Paper 1)
CC12: **Reversable Reactions and Equilibria** (Paper 1)

Lesson	Objectives Tracker Sheet	Date covered	I know this well	I need to do more work on this
CC10a Electrolysis	C3.22 Recall that electrolytes are ionic compounds in the molten state or dissolved in water.			
	C3.23 Describe electrolysis as a process in which electrical energy, from a direct current supply, decomposes electrolytes.			
	C3.24 Explain the movement of ions during electrolysis, in which: positively charged cations migrate to the negatively charged cathode negatively charged anions migrate to the positively charged anode.			
	C3.27 **H** Write half equations for reactions occurring at the anode and cathode in electrolysis.			
	C3.28 **H** Explain oxidation and reduction in terms of loss or gain of electrons			
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CC10a Electrolysis of copper sulfate solution – Core Practical	C3.31 Investigate the electrolysis of copper sulfate solution with inert electrodes and copper electrodes.			
CC10b Products from electrolysis	C3.25 Explain the formation of the products in the electrolysis, using inert electrodes, of some electrolytes, including: copper chloride solution sodium chloride solution sodium sulfate solution water acidified with sulfuric acid molten lead bromide (demonstration).			
	C3.26 Predict the products of electrolysis of other binary, ionic compounds in the molten state.			
	C3.30 Explain the formation of the products in the electrolysis of copper sulfate solution, using copper electrodes, and how this electrolysis can be used to purify copper.			

	C1.52 **H** Explain why, in a reaction, the mass of product formed is controlled by the mass of the reactant which is not in excess.			
	C1.53 **H** Deduce the stoichiometry of a reaction from the masses of the reactants and products.			
CC11a Reactivity	4.1 Deduce the relative reactivity of some metals, by their reactions with water, acids and salt solutions.			
	4.2 **H** Explain displacement reactions as redox reactions, in terms of gain or loss of electrons			
	4.3 Explain the reactivity series of metals (potassium, sodium, calcium, magnesium, aluminium, (carbon), zinc, iron, (hydrogen), copper, silver, gold) in terms of the reactivity of the metals with water and dilute acids and that these reactions show the relative tendency of metal atoms to form cations.			
CC11b Ores	4.4 Recall that: most metals are extracted from ores found in the Earth's crust unreactive metals are found in the Earth's crust as the uncombined elements.			
	4.7 Explain why the method used to extract a metal from its ore is related to its position in the reactivity series and the cost of the extraction process, illustrated by: heating with carbon (including iron) electrolysis (including aluminium) (knowledge of the blast furnace is not required).			
	4.8 **H** Evaluate alternative biological methods of metal extraction (bacterial and phytoextraction).			
CC11c Oxidation and reduction	4.2 **H** Explain displacement reactions as redox reactions, in terms of gain or loss of electrons.			
	4.5 Explain oxidation as the gain of oxygen and reduction as the loss of oxygen.			
	4.6 Recall that the extraction of metals involves reduction of ores.			
	4.9 Explain how a metal's relative resistance to oxidation is related to its position in the reactivity series.			

CC11d Life cycle assessment and recycling	4.10 Evaluate the advantages of recycling metals, including economic implications and how recycling can preserve both the environment and the supply of valuable raw materials.			
	4.11 Describe that a life time assessment for a product involves consideration of the effect on the environment of obtaining the raw materials, manufacturing the product, using the product and disposing of the product when it is no longer useful.			
	4.12 Evaluate data from a life cycle assessment of a product.			
CC12a Dynamic equilibrium	C4.13 Recall that chemical reactions are reversible, the use of the symbol ⇌ in equations and that the direction of some reversible reactions can be altered by changing the reaction conditions			
	C4.14 Explain what is meant by dynamic equilibrium.			
	C4.15 Describe the formation of ammonia as a reversible reaction between nitrogen (extracted from the air) and hydrogen (obtained from natural gas) and that it can reach a dynamic equilibrium.			
	C4.16 Recall the conditions for the Haber process as: a temperature 450°C b pressure 200 atmospheres c iron catalyst.			
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