

Syllabus content for the unit **Mining and Minerals [MM]**

Extracting Metals from Minerals	Composition of Chemicals
<p>Know that the separation of a metal from any compound is a reduction reaction</p> <p>Understand how the method used to extract a metal from its compound is related to the activity of the metal</p> <p>Know that zinc and metals lower in the activity series can be extracted from their ores by heating with coke</p> <p>Know the blast furnace process for extraction of iron [CM]</p> <p>Understand that a metal may be displaced from a compound by another metal of greater activity (thermit process, displacement of copper by magnesium)</p> <p>Know that electricity can be used to extract very reactive metals from their ores</p> <p>Know that compounds of transition metals are often coloured (iron and copper compounds) [BB]</p> <p>Know that transition metals can form more than one series of compounds (limited to iron(II) and iron(III)) [RE, BB]</p> <p>Know uses of transition metals in alloys (limited to stainless steel Fe/Ni/Cr and brass Cu/Zn)</p> <p>Know the uses of transition metals in coinage</p> <p>Know that adding oxygen is oxidation and removing oxygen is a reduction reaction</p> <ul style="list-style-type: none"> • Know that the separation of a metal from any compound is a reduction reaction <p>Know that corrosion of metals is an oxidation reaction that is non-useful [CM]</p> <p>know the conditions needed for iron to rust and the methods used to prevent it [CM]</p> <p>be able to relate the position of a metal in the activity series to its chemical activity [CM, BB]</p> <p>be able to use given information about chemical reactions to recognise patterns of behaviour</p>	<p>Know the meaning of atomic (proton) number and mass number for an element</p> <p>Know that new substances are formed when atoms combine [TC, BB]</p> <p>Know that all materials are made up of one or more of the elements</p> <p>Know that compounds have a fixed composition and can be represented by formulae [FT, TC]</p> <ul style="list-style-type: none"> • Understand how ionic lattices can be represented diagrammatically <p>Understand the relationship between structure and properties (melting point, electrical conductivity) of ionic compounds (sodium chloride, magnesium oxide) [BB]</p> <p>Be able to write word equations to represent chemical reactions [TC, FT]</p> <p>Know that mass is conserved in chemical reactions [TC]</p> <p>Be able to interpret chemical formulae in terms of the elements and the number of atoms present [FT, TC]</p> <p>Be able to interpret, construct and balance symbol equations [FT, TC]</p> <ul style="list-style-type: none"> • Be able to calculate relative formula masses from relative atomic masses of the elements present [FT] • Be able to calculate the formula of a simple binary compound from reacting masses [FT] • Be able to calculate reacting masses from balanced chemical equations [FT]

What are Minerals?	Understanding Electrolysis
<p>Know that minerals are naturally occurring substances with a definite composition</p> <p>Know that a rock may consist of one or more minerals</p> <p>Know that a useful mineral in a rock is called an ore</p> <p>Know that a variety of useful substances can be made from rocks and minerals</p> <p>Know that metal ores are often sulphide or oxide compounds of the metal</p> <ul style="list-style-type: none"> • Know some of the ecological, environmental, economic and social advantages and disadvantages of mineral extraction • Know some of the ways in which the effects of mining on the environment can be reduced • Know that transport of chemicals has social, economic and environmental implications [TC] <p>Know that some substances decompose on heating (limited to action of heat on carbonates)</p> <p>Know the general reaction of carbonates with acids [CM]</p>	<p>Know that electrolysis is the splitting of ionic compounds by electricity</p> <ul style="list-style-type: none"> • Know that electrolysis can only occur when ions are free to move in melts or in solution [BB] • Understand that positive ions move towards the cathode during electrolysis and negative ions move towards the anode <p>Be able to describe the extraction of aluminium by electrolysis</p> <p>Know how copper can be purified by electrolysis</p> <ul style="list-style-type: none"> • Understand the use of + and – signs to show charges on ions [BB] • Be able to write ionic half-equations for simple primary electrode processes in electrolysis <p>know that in electrolysis, current is a flow of ions</p> <p>Know why chlorine is used in sterilising water supplies</p> <p>Know that Group VII of the Periodic Table forms a family of elements called halogens with similar chemical properties [TC, BB]</p> <p>Know that compounds of metals with non-metals are formed by electron transfer and contain ions [BB]</p> <p>Understand that metals form positive ions and non-metals form negative ions</p>

All candidates may be required to know the chemical changes involved in the manufacture of ammonia by the Haber process, or sulphuric acid by the contact process. Double award candidates only may be asked about the manufacture of other chemicals; questions will provide the necessary factual information. Candidates will be asked to interpret the data given in terms of the general chemical principles illustrated. Examples particularly recommended for study include the manufacture of – iron from the blast furnace [CM] – lime from limestone – aluminium by electrolysis – sodium hydroxide - chlorine

Be able to recognise the processes in chemical manufacture as applications of the patterns listed above [TC, FT]