Co-teaching document

New ELC Science (5960) and Foundation Level GCSE Combined Science: Trilogy (8464)

Chemistry: Component 3 – Elements, mixtures and compounds

ELC Outcomes	Summary of content covered in ELC	Same theme covered in Combined but extra content	New content on same topic	Rest of Combined Foundation content
1. Atoms and elements	All substances are made of atoms. An atom is the smallest part of an element. The elements are shown in the periodic table and elements in the same group of the periodic table have similar properties.	5.1.1.1 Extra parts – atomic symbols (first 20, Group 1 and Group 7). 5.1.2.1 Arrangement of the periodic table in terms of electronic structure.	5.1.1.3 Development of the model of the atom. 5.1.2.2 Development of the periodic table.	5.11 Key ideas. 5.1.1.4 Relative electrical charges of subatomic particles. 5.1.1.5 Size and mass of atoms. 5.1.1.6 Relative atomic mass. 5.1.1.7 Electronic structure. 5.1.2.4 Group 0. 5.1.2.5 Group 1. 5.1.2.6 Group 7.

2. Elements and compounds	Atoms combine with different atoms to form a compound. Compounds can be made by metals combining with non-metals or by non-metals combining with other non-metals. Simple reactions can be described as word equations.	5.1.1.1 Extra parts – energy changes; formulae and naming compounds; symbol equations.		5.2.1 Chemical bonds, ionic, covalent and metallic.
Practical development	Investigate the reaction when magnesium burns in oxygen (air) to produce magnesium oxide. Compare the properties of iron and sulfur with those of iron sulphide.			
3. States of matter	The three states of matter are solid, liquid and gas. Definitions of the changes between the three states using the terms melting, boiling, condensing and freezing. Simple particle model to explain the states of matter.	5.2.2.1 Predictions of state based on data; explanations of changes of state based on energy changes. 5.2.2.2 State symbols.		5.2.2.3 Properties of ionic compounds. 5.2.2.4 Properties of small molecules.

Practical development	Investigate the changes in state from ice to steam.			
4. Forms (allotropes) of carbon	Diamond and graphite are both forms of carbon but with different structures that determine their properties.	5.2.3.1 Diamond. 5.2.3.2 Graphite Details of bonding.	5.2.3.3 Graphene and fullerenes.	
Practical development	Investigate the properties of graphite as a lubricant and for writing.			
5. Mixtures	Mixtures contain two or more substances which are not chemically combined. The appropriate method to separate mixtures by filtration, distillation, crystallisation or chromatography.	5.1.1.2 More complex definition of mixture. Inclusion of fractional distillation.		5.8.1.1 Pure substances. 5.8.1.2 Formulations.
Practical development	Use filtration / distillation / crystallisation to separate substances. Compare the time needed to filter mixtures of water and calcium carbonate that has different particle sizes.			

6. Chromatography	Describe how to separate mixtures by chromatography. Recognise that in paper chromatography, a solvent moves through the paper carrying different compounds different distances.	5.8.1.3 Chromatography – definitions of phases; use of R_f and correct use of significant figures; differences between pure and impure substances.		
Practical development	Investigate the different colours in inks or food colours using paper chromatography.		Required practical 12 (6) – Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R_f values.	
7. Extraction of metals from their ores	Unreactive metals are found in the Earth as metals. Most metals are found as compounds that need chemical reactions to extract the metal. Metals less reactive than carbon can be extracted by heating the metal ore with carbon. An ore is a rock containing enough metal to make it economic to extract it and	5.4.1.3 Extraction of metals and reduction: Definition of reduction and identification of which substances are reduced/oxidised. Interpretation of data relating to metal extraction. 5.10.2.2 Ways of reducing the use of resources – part relevant to metals.	5.1.2.3 Metals and non-metals in terms of electronic structure.	5.3 Quantitative chemistry. 5.4.1.1 Metal oxides. 5.4.3 Electrolysis (including the required practical 9: Investigate what happens when aqueous solutions are electrolysed using inert electrodes.) 5.10.2.1 Life cycle assessment. 5.10.2.2 Ways of reducing the use of resources.

	large amounts of rock have to be quarried or mined to get metal ores. The effects of extracting metals can be reduced by recycling.			
Practical development	Model smelting by extracting copper from malachite or lead from galena using carbon.			
8. Properties of metals	Metals have giant structures of atoms with strong bonds between the atoms so most metals have high melting points. Properties of metals Relate uses of metals to their properties. eg copper and aluminium.	5.2.2.7 Properties of metals and alloys: arrangement of atoms in layers. 5.2.2.8 Metals as conductors – explanation of conductivity in terms of electrons.		
Practical development	Compare the properties such as conductivity or density of some metals**.**			
9. Alloys	Most metals in everyday use are alloys. An alloy is produced by mixing small amount of other elements with the metal eg steel.	5.2.2.7 Properties of metals and alloys: explanation in terms of the distortion of the layers of atoms.		

Practical development	Investigate the melting points of tin, lead and solder**.** Investigate the hardness of different alloys or steels.			
10. Polymers	Polymers are made from small molecules called monomers joined together in very long chains. The uses of polymers are related to their properties. Polymers are not biodegradable (not broken down by microbes) and there are problems with the disposal of polymers.	5.2.2.5 Polymers – recognition of polymers from diagrams showing bonding and structure.		5.2.2.6 Giant covalent structures.
Practical development	Compare the biodegradability of different polymers and other materials.			