AQA Chemistry GCSE Student Progress

Unit 4.8 - Chemical Analysis

4.8.1. Purity, Formulations and Chromatography

4.8.1.1. Pure Substances

a	I know that, in everyday language, a pure substance can mean a substance that has had nothing added to it, so it is unadulterated and in its natural state, e.g. pure milk.			
b	I know that, in chemistry, a pure substance is a single element or compound, not mixed with any other substance.			
c	I know that pure elements and compounds melt and boil at specific temperatures and that melting point and boiling point data can be used to distinguish pure substances from mixtures.			

4.8.1.2. Formulations

a	I know that a formulation is a mixture that has been designed as a useful product.			
b	I know that many products are complex mixtures in which each chemical has a particular purpose.			
c	I know that formulations are made by mixing the components in carefully measured quantities to ensure that the product has the required properties, e.g. fuels, cleaning agents, paints, medicines, alloys, fertilisers and foods.			
d	I can identify formulations given appropriate information.			

4.8.1.3. Chromatography

a	I know that chromatography can be used to separate mixtures and can give information to help identify substances.			
b	I know that the compounds in a mixture may separate into different spots depending on the solvent but a pure compound will produce a single spot in all solvents.			
c	I know that chromatography involves a stationary phase and a mobile phase and that separation depends on the distribution of substances between the phases.			
d	The ratio of the distance moved by a compound (centre of spot from origin) to the distance moved by the solvent can be expressed as its Rf value: Rf = distance moved by substance / distance moved by solvent			
e	I know that different compounds have different Rf values in different solvents, which can be used to help identify the compounds.			
f	I can explain how paper chromatography separates mixtures.			
g	I can suggest how chromatographic methods can be used for distinguishing pure substances from impure substances.			
h	I can interpret chromatograms and determine Rf values from chromatograms and provide answers to an appropriate number of significant figures.			

4.8.2. Identification of Common Gases

4.8.2.1 Test for Hydrogen

a	I know that the test for hydrogen uses a burning splint held at the open end of a test tube of the gas, and that hydrogen burns rapidly with a pop sound.			

4.8.2.2 Test for Oxygen

a	I know that the test for oxygen uses a glowing splint inserted into a test tube of the gas, and that the splint relights in oxygen.			

4.8.2.3 Test for Carbon Dioxide

a	I know that the test for carbon dioxide uses an aqueous solution of calcium hydroxide (lime water). When carbon dioxide is shaken with or bubbled through limewater the limewater turns milky (cloudy).			

4.8.2.4 Test for Chlorine

a	I know that the test for chlorine uses litmus paper, and that when damp litmus paper is put into chlorine gas the litmus paper is bleached and turns white.			

4.8.3. Identification of Ions by Chemical and Spectroscopic Means (Chemistry Only)

4.8.3.1 Flame Tests (Chemistry Only)

a	I know that flame tests can be used to identify some metal ions (cations).			
b	I know that lithium, sodium, potassium, calcium and copper compounds produce distinctive colours in flame tests: • lithium compounds result in a crimson flame; • sodium compounds result in a yellow flame; • potassium compounds result in a lilac flame; • calcium compounds result in an orange-red flame; • copper compounds result in a green flame. I can identify species from the results of the tests.			
c	I know that, if a sample containing a mixture of ions is used, some flame colours can be masked.			

4.8.3.2 Metal Hydroxides (Chemistry Only)

a	I know that sodium hydroxide solution can be used to identify some metal ions (cations).			
b	I know that solutions of aluminium, calcium and magnesium ions form white precipitates when sodium hydroxide solution is added but only the aluminium hydroxide precipitate dissolves in excess sodium hydroxide solution.			
c	I know that solutions of copper (II), iron (II) and iron (III) ions form coloured precipitates when sodium hydroxide solution is added: • copper (II) forms a blue precipitate; • iron (II) forms a green precipitate; • iron (III) forms a brown precipitate.			
d	I can write balanced equations for the reactions to produce the insoluble hydroxides.			

4.8.3.3 Carbonates (Chemistry Only)

a	I know that carbonates react with dilute acids to form carbon dioxide gas.			

4.8.3.4 Halides (Chemistry Only)

a	Halide ions in solution produce precipitates with silver nitrate solution in the presence of dilute nitric acid: • silver chloride is white; • silver bromide is cream; • silver iodide is yellow.			

4.8.3.5 Sulphates (Chemistry Only)

a	I know that sulphate ions in solution produce a white precipitate with barium chloride solution in the presence of dilute hydrochloric acid.			

4.8.3.6 Instrumental Methods (Chemistry Only)

a	I know that elements and compounds can be detected and identified using instrumental methods that are accurate, sensitive and rapid.			
b	I can state advantages of instrumental methods compared with the chemical tests described earlier.			

4.8.3.7 Flame Emission Spectroscopy (Chemistry Only)

a	I know that flame emission spectroscopy is an example of an instrumental method used to analyse metal ions in solutions.			
b	I know that, in flame emission spectroscopy, the sample is put into a flame and the light given out is passed through a spectroscope. The output is a line spectrum that can be analysed to identify the metal ions in the solution and measure their concentrations.			
c	I can interpret an instrumental result given appropriate data in chart or tabular form.			