

## C1.7 Chemical Analysis- Triple REVISION

<b><u>Pure substances</u></b>	
1. What is a pure substance?	A single element or compound not mixed with any other substance. It exists in its natural state
2. What can you say about the melting and boiling points of pure elements and compounds	They are at specific temperatures
3. What can we use to distinguish pure substances from mixtures?	Melting point and boiling point data
<b><u>Formulations</u></b>	
1. What is a formulation?	A mixture that has been designed as a useful product.
2. Give 3 examples of formulations	Fuels, cleaning agents, paints, medicines, alloys, fertilisers and foods
3. Why is it important that when making a formulation, the components being mixed together are carefully measured?	So that the product has the desired properties
<b><u>Chromatography</u></b>	
1. What is paper chromatography used for?	To separate mixtures and identify substances
2. What are the two phases involved in chromatography?	Stationary phase and mobile phase
3. What do we call the solution that moves up the paper and separates the components in the mixture?	Solvent
4. Give the equation to calculate the R <sub>f</sub> value	$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$
5. Do all compounds have the same R <sub>f</sub> value?	No, Different compounds have different R <sub>f</sub> values in different solvents
6. What is the name given to the result of chromatography?	Chromatogram
7. How many spots will a pure compound produce?	One single spot
8. What can you say about the component that has travelled the furthest up the paper in a chromatogram?	This component is the most soluble
9. What information can you get from a chromatogram?	<ul style="list-style-type: none"> <li>• Number of dots = how many different components in the sample</li> <li>• Same components will separate at same distances</li> <li>• Different components separate at different points</li> <li>• The higher the ink has travelled the more soluble the component</li> <li>• Calculate R<sub>f</sub> values</li> </ul>
<b><u>Identification of common gases</u></b>	
1. What are the four gases you need to know the tests for?	Hydrogen, oxygen, carbon dioxide, chlorine

2. Describe the test for hydrogen	A burning splint is held at the open end of a test tube of the gas. Hydrogen burns rapidly with a pop sound
3. Which gas relights a glowing splint?	Oxygen
4. Describe the test for carbon dioxide	Calcium hydroxide (limewater is used). When carbon dioxide is shaken with or bubbled through limewater the limewater turns milky (cloudy).
5. Which gases is litmus paper used to test for? What is the result if this gas is present?	Chlorine → the damp litmus paper is bleached and turns white
<b>TRIPLE ONLY- Flame tests</b>	
1. What colour flame do lithium compounds produce in a flame test?	Crimson flame
2. What colour flame do sodium compounds produce in a flame test?	Yellow flame
3. What colour flame do potassium compounds produce in a flame test?	Lilac flame
4. What colour flame do calcium compounds produce in a flame test?	Orange-red flame
5. What colour flame do copper compounds produce in a flame test?	Green flame
6. What can be the problem if a sample containing a mixture of ions is used in a flame test?	Some flame colours can be masked
<b>TRIPLE ONLY - Metal hydroxides</b>	
1. What is a precipitate?	A solid produced in a liquid
2. What is sodium hydroxide solution used for?	Identify metal ions (Cations)
3. What is formed when sodium hydroxide solution is added to solutions of aluminium, calcium and magnesium ions?	A white precipitate
4. Which precipitate formed from the metal ions above is the only one to dissolve in excess sodium hydroxide solution?	Aluminium hydroxide precipitate
5. What is special about the precipitates formed from solutions of copper(II), iron(II) and iron(III) ions when sodium hydroxide solution is added?	They form coloured precipitate
6. What colour precipitate is formed from copper (II) ions?	Blue precipitate
7. What colour precipitate is formed from iron (II) ions?	Green precipitate
8. What colour precipitate is formed from iron (III) ions?	Brown precipitate
9. Write the symbol equation for the formation of copper hydroxide from copper ions	$\text{Cu}^{2+} + 2\text{OH}^- \rightarrow \text{Cu}(\text{OH})_2$
10. Write the symbol equation to show the formation of a brown precipitate (HINT: think about which metal ions form a brown precipitate)	$\text{Fe}^{3+} + 3\text{OH}^- \rightarrow \text{Fe}(\text{OH})_3$
<b>TRIPLE ONLY - Carbonates, halides and sulfates</b>	

1. What gas is produced when carbonates react with acids and how can we test for this gas?	Carbon dioxide. Test for this using limewater
2. What is produced when halide ions react with silver nitrate in solution in the presence of dilute nitric acid?	Precipitates
3. What colour precipitate is silver chloride?	White precipitate
4. What colour precipitate is silver bromide?	Cream precipitate
5. What colour precipitate is silver iodide?	Yellow precipitate
6. What colour precipitate do sulfate ions in solution with barium chloride solution and dilute hydrochloric acid produce?	White precipitate
<b><u>TRIPLE ONLY – Instrumental methods and flame emission spectroscopy</u></b>	
1. What are the three advantages of using instrumental methods?	Accurate, sensitive and rapid
2. What is flame emission spectroscopy used to analyse?	Metal ions in solution
3. Outline the process of flame emission spectroscopy	<ul style="list-style-type: none"> <li>• The sample is put into a flame and the light given out is passed through a spectroscope.</li> <li>• The output is a line spectrum</li> </ul>
4. What can this line spectrum be used for?	<ul style="list-style-type: none"> <li>• To identify the metal ions in the solution</li> <li>• Measure their concentrations.</li> </ul>