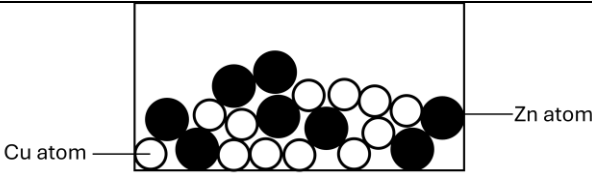
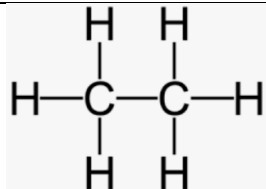
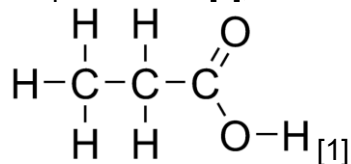


Paper 1: Multiple Choice Items (20 marks)

1	2	3	4	5	6	7	8	9	10
B	C	C	B	D	D	B	A	B	C
11	12	13	14	15	16	17	18	19	20
D	D	A	D	C	B	B	D	C	C

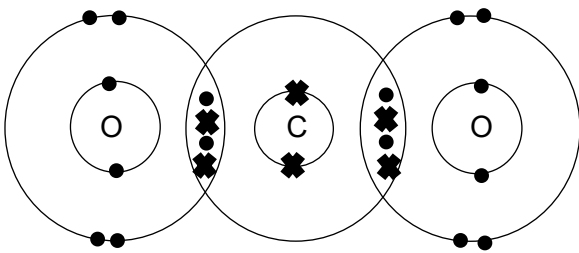
Paper 3: Section A (55 marks)

Qn No		Answers	Marks	Total
1	(a)(i)	N and F	1	5
	(ii)	Ar	1	
	(b)(i)	40	1	
	(ii)	28	1	
	(iii)	$3.5 / 70 = 0.05 \text{ mol}$	1	
2		Calcium hydroxide / calcium oxide / slaked lime / quicklime; Hydrogen / nickel catalyst Any ammonium salt; Potassium iodide; Acidified potassium manganate(VII);	5	5
3	(a)	$2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$ [1] correct balanced equation	1	6
	(b)	Exothermic (no marks) Copper glows brightly, energy is given out.	1	
	(c)	Basic oxide (no marks) Copper is a metal; metal oxides are (generally) basic.	1	
	(d)	Arrangement: Very closely packed, orderly arrangement [1] Movement: Vibrate about their fixed positions [1]	2	
	(e)	 Cu atom — Zn atom Ratio of Cu:Zn must be 3:2	1	
4	(a)	Any one: • Malleable • Ductile • Conduct electricity • Good conductor of heat	1	7
	(b)	• more reactive metals forms more stable compound / more reactive metals form stronger bonds to other elements Examples: Any two • Calcium is very reactive and requires electrolysis, while • Iron moderately reactive can be extracted by reduction iron ore with carbon. • Gold is so unreactive it occurs naturally as the element	3	

Qn No		Answers	Marks	Total
	(c)(i)	To remove (dissolved) oxygen from water.	1	
	(ii)	Nail in Experiment A will rust. [1] Oxygen and water are present in experiment A. [1]	2	
5	(a)(i)	$\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$	1	6
	(ii)	1. Number of mole of fumaric acid = $20/1000 \times 0.2$ = 0.004 mol [1] 2. Number of moles of sodium hydroxide = 0.004×2 = 0.008 [1] 3. Volume of sodium hydroxide = $0.008 / 0.5$ = 0.016 dm ³ = 16 cm ³ [1]	3	
	(b)	Test: add aqueous bromine (no marks) Observation with fumaric acid: brown bromine decolourises / turns colourless [1] Observation with ethanoic acid: remain browns [1] / No observable change (only if "brown" was mentioned in previous point)	2	
6	(a)(i)	Silver ion (no marks) Silver ion gains electrons / Cause bromide ions to lose electrons .	1	5
	(ii)	Section covered will remain white/cream [1]; section not covered will turn black [1]	2	
	(b)(i)		1	
	(ii)	$\text{CH}_4 + 2\text{Cl}_2 \rightarrow \text{CH}_2\text{Cl}_2 + 2\text{HCl}$	1	
7	(a)	P: aluminium nitrate / $\text{Al}(\text{NO}_3)_3$ Q: ammonia / NH_3 R: aqueous ammonia / Ammonia water S: aluminium hydroxide / $\text{Al}(\text{OH})_3$ T: Sulfuric acid / H_2SO_4	5	7
	(b)	$\text{Al}^{3+}(\text{aq}) + 3\text{OH}^-(\text{aq}) \rightarrow \text{Al}(\text{OH})_3(\text{s})$ [1] correct balanced equation [1] correct state symbols	2	
8	(a)(i)	Draw a thermometer (bulb beside the side arm) + Label	1	7
	(ii)	Boiling points of butanol and pentanol are above 100 °C, the boiling point of water . [1]	1	
	(b)	Propanoic acid [1]; 	2	
	(ci)	37 °C (no marks) At 100 °C, enzymes in yeast are denatured [1]	1	

Qn No		Answers	Marks	Total
	(cii)	When plant grows, it takes in carbon dioxide (during photosynthesis), [1] which offsets the carbon dioxide produced when bioethanol is burnt. [1]	2	7
9	(a)	Metal 1 is a unreactive metal , so no reaction , and no mass loss . [1] Metal 4 is a reactive metal and reacts with acid, releasing more hydrogen gas , causing a greater mass loss . [1]	2	
	(b)	Rate of reaction will be slower . [1] Since lumps of the metal were used, the particle size increased leading to the decrease in the surface area to react with the acid. [1] Decrease in surface area decreases the frequency of effective collisions . [1]	3	
	(c)	Curve that is below curve of metal 4 [1] Curve that ends at 0.5 [1]	2	

Section B

Qn No		Answers	Marks	Total
10	(a)	 [1] Correct number of shared electrons [1] correct number of electrons for carbon and oxygen atoms.	2	10
	(b)(i)	Natural activity: respiration / decomposition of plants and animals [1] Human activity: combustion of carbon containing fuel. [1]	2	
	(ii)	Global warming	1	
	(c)	Green to yellow Reject green to orange	1	
	(d)(i)	$\text{MgO} + \text{H}_2\text{CO}_3 \rightarrow \text{MgCO}_3 + \text{H}_2\text{O}$	1	
	(ii)	Any one: - Reaction with carbonic acid will be slower than hydrochloric acid. - Reaction with carbonic acid will produce a precipitate.	1	
	(e)	Carbon dioxide is a simple covalent molecule/has simple molecular structure with no mobile electrons/ions to act as charge carriers. [1] Carbonic acid is an acid with the presence of H⁺ ions in an aqueous solution . The mobile ions can act as charge carriers. [1]	2	

Qn No		Answers	Marks	Total	Comments										
11	(a)(i)	Alkali metal	1	10											
	(ii)	Potassium (is very reactive), reacts readily with oxygen in the air to form an oxide layer.	1												
	(iii)	Group 1 metals lose electron readily to form ions. (Reducing agents oxidise easily)	1												
	(b)(i)	Carbon dioxide	1												
	(ii)	The more reactive a metal, the more stable the metal carbonate.	1												
	(iii)	Between 380 to 600. [1] Magnesium is between calcium and zinc in the reactivity series. [1]	2												
	(c)	<table><tr><td>metal</td><td>aqueous solution</td><td>colour at the start</td><td>colour at the end</td></tr><tr><td>magnesium</td><td>iron(II) sulfate</td><td>green</td><td>colourless</td></tr><tr><td>silver</td><td>copper(II) sulfate</td><td>blue</td><td>blue</td></tr></table>	metal		aqueous solution	colour at the start	colour at the end	magnesium	iron(II) sulfate	green	colourless	silver	copper(II) sulfate	blue	blue
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