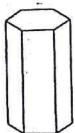


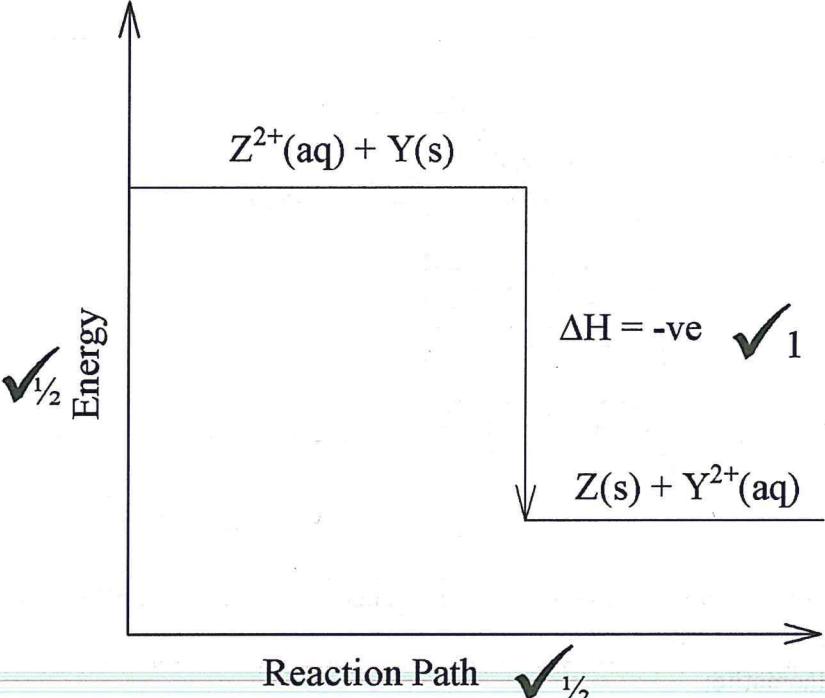
4.7 CHEMISTRY (233)

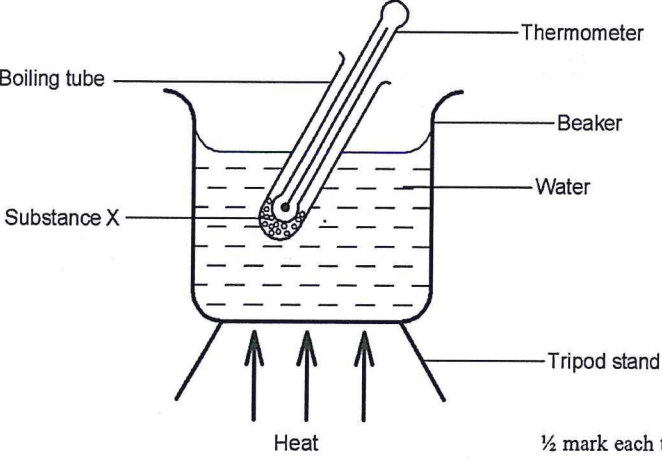
4.7.1 Chemistry Paper 1 (233/1)

No.		Responses	Marks
1.	(a)	A soluble base is a substance that dissociates in water to produce hydroxide ions as the only negative ions.	(1 mark)
	(b)	- Nitric(V) acid. This is because nitric(V) acid is a strong acid and dissociates completely in solution producing many H ⁺ ions.	(1 mark) (1 mark) (3 marks)
2.	(a)	- The reaction starts but soon stops. This is because the insoluble barium sulphate produced forms a coating on the surface of the barium carbonate preventing further reaction and evolution of carbon(IV) oxide gas.	(1 mark) (1 mark) (½ mark)
	(b)	- Downward delivery. - Carbon(IV) oxide is denser than air.	(½ mark) (3 marks)
3.	(a)(i)	CH ₃ CH ₂ CH ₂ OH and CH ₃ COOH	(1 mark)
	(ii)	CH ₃ CCCH ₃	(1 mark)
	(b)	But-2-yne	(1 mark) (3 marks)
4.	(a)	Monoclinic sulphur / beta sulphur / prismatic sulphur	(1 mark)
	b)		(1 mark)
	(c)	$S_{(s)} + 2H_2SO_{4(l)} \rightarrow 3SO_{2(g)} + 2H_2O_{(g)}$	(1 mark) (3 marks)
5.		- Place a small piece of sodium metal on water in a trough. - When the reaction stops, drop a strip of red litmus paper to the resulting solution. - The red litmus paper turns blue showing that the resulting solution is alkaline. (Any indicator used)	(1 mark) (1 mark) (1 mark) (3 marks)
6.		Graham's Law of diffusion	
	(a)	The rate of diffusion of a gas is inversely proportional to the square root of its density at constant temperature and pressure.	(1 mark)
	(b)	Helium is less dense than argon hence it diffuses out of the balloon faster than argon.	(2 marks) (3 marks)

No.		Responses	Marks
7.		$2\text{NaOH}_{(aq)} + \text{H}_2\text{x}_{(aq)} \rightarrow 2\text{Nax}_{(aq)} + 2\text{H}_2\text{O}_{(l)}$ <p>Mole ratio 2:1</p> <p>Concentration of sodium hydroxide in Moles = $\frac{8}{40} = 0.2\text{M}$</p> <p>Moles of NaOH = $\left(\frac{0.2 \times 30}{1000}\right) = 0.006\text{moles}$</p> <p>Moles of $\text{H}_2\text{x} = \left(\frac{0.006}{2}\right) = 0.003\text{moles}$</p> <p>RFM of the acid = $\frac{0.294}{0.003}$</p> <p style="text-align: center;">= 98</p> <p style="text-align: center;">OR</p> <p>$(2 \times 40)\text{g} = \text{X}$</p> <p>$\left(8 \times \frac{30}{1000}\right)\text{g} = 0.294\text{g}$</p> $\frac{x}{0.294} = \frac{2 \times 40}{8 \times \frac{30}{1000}}$ $\text{X} = \frac{80 \times 0.294}{0.24}$ <p style="text-align: center;">= 98</p>	<p>(½ mark)</p> <p>(½ mark)</p> <p>(½ mark)</p> <p>(½ mark)</p> <p>(½ mark)</p> <p>(½ mark)</p> <p style="text-align: center;">(3 marks)</p>
8.	(a) (b) (c)	<p>Carbonate (CO_3^{2-})</p> <p>$\text{Ba}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \rightarrow \text{BaCO}_3(\text{s})$</p> <ul style="list-style-type: none"> - Making soft drinks/aerated drinks; - In refrigeration; - In extinguishing fires; - Making baking powder; <p>Manufacture of sodium carbonate; Cloud seeding.</p> <p style="text-align: center;">(Any 1 correct = 1 mark)</p>	<p>(1 mark)</p> <p>(1 mark)</p> <p>(1 mark)</p> <p style="text-align: center;">(3 marks)</p>
9.	(a) (b) (i) (ii)	<p>Chromatography/paper chromatography</p> <p>Q</p> <p>S</p>	<p>(1 mark)</p> <p>(1 mark)</p> <p>(1 mark)</p> <p style="text-align: center;">(3 marks)</p>
10.		<ul style="list-style-type: none"> - Wet a measuring cylinder/gas jar and sprinkle some iron filings on the wet surface. Remove the excess iron filings; - Invert the measuring cylinder in a trough of water; - Take the reading of the air column in the measuring cylinder. Leave the set-up for 2 days; - Read and record the volume of the air column; 	<p>(½ mark)</p> <p>(½ mark)</p> <p>(½ mark)</p> <p>(½ mark)</p>

No.		Responses	Marks
		<ul style="list-style-type: none"> - The volume of the air reduced and the grey filings changed to a brown substance; - The brown substance is a compound of iron and oxygen; - The oxygen in the air reacted with the iron fillings to form rust. 	(½ mark) (½ mark) (3 marks)
11.		<ul style="list-style-type: none"> - The oxide of U has higher melting point than the oxide of V; - This is because the oxide of U is a solid with ionic bonds hence requires a lot of energy to melt; - The oxide of V is a gas hence requires little energy to melt/break molecular forces of attraction. 	(1 mark) (½ mark) (½ mark) (½ mark) (3 marks)
12.	(a) (b)	Polythene / Polyethene It is non-biodegradable, hence pollutes the environment.	(1 mark) (2 marks) (3 marks)
13.	(a) (b)	No effect/does not affect the position of the equilibrium. Forward reaction is exothermic, excessive temperatures would favour the backward reaction therefore lowering the yield of ammonia.	(1 mark) (2 marks) (3 marks)
14.		<ul style="list-style-type: none"> - One reagent is missing, hence reagents provided cannot produce chlorine; - Wrong drying agent – Calcium oxide will react with the chlorine gas; - Incorrect method of gas collection - No gas will be collected / chlorine is denser than air. 	(1 mark) (1 mark) (1 mark) (3 marks)
15.		<ul style="list-style-type: none"> - Measure a certain volume of dilute nitric(V) acid and place it in a beaker; - Add potassium hydrogen carbonate little by little as the mixture is stirred until effervescence stops; - Evaporate the solution to saturation and allow to cool for crystals to form; - Dry the crystals in between filter papers. 	(½ mark) (1 mark) (½ mark) (½ mark) (3 marks)
16.	(a) (b) (c)	Salt bridge - Provides electrical contact between the electrodes//completes the circuit; - Provides cations and anions to replace those used up. (Any 1 correct @ 1 mark) $\text{e.m.f of cell} = E^{\ominus} \text{reduced} - E^{\ominus} \text{oxidized}$ $= -0.13 - -0.76$ $= +0.63V$	(1 mark) (1 mark) (½ mark) (½ mark) (3 marks)

No.		Responses	Marks
17.	(a) (b) (c)	2.8.4 period 3, group 8 E has a bigger atomic radius than A / the valence electrons of element E are further from the nucleus, hence loosely held by the positive nucleus and requires less energy to be removed during reaction. OR A has a smaller atomic radius than E / the valence electrons of element A are closer to the nucleus, hence strongly held by the positive nucleus and requires more energy to be removed during a reaction.	(1 mark) (1 mark) (1 mark) (3 marks)
18.	(a) (b)	Molar heat of displacement is the enthalpy change that occurs when one mole of a substance is displaced from its ions in solution. 	(1 mark) (2 marks) (3 marks)
19.	(a) (b)	α - positively charged / ${}^4_2\text{He}$ β - negatively charged / ${}^0_{-1}\text{e}$ ${}^{210}_{82}\text{Pb} \rightarrow {}^a_b\text{x} + 2 {}^0_{-1}\text{e}$ $a = 210 + 0 = 210$ $b = 82 + 2 = 84$ mass no = 210 Atomic number = 84	(1/2 mark) (1/2 mark) (1 mark) (1 mark) (3 marks)

No.		Responses	Marks
20.	(a)	- Reducing agent – Zn - The oxidation number of Zn increased from 0 to +2 OR Zn Zn loses electrons form zinc ions/ Zn is oxidized to Zn²⁺	(1 mark) (1 mark)
	(b)	Galvanization	(1 mark) (3 marks)
21.	(a)	Water	(1 mark)
	(b)	$CO_{2(g)} + Ca(OH)_{2(aq)} \rightarrow CaCO_{3(s)} + H_2O_{(l)}$	(1 mark)
	(c)	Burning candle /organic matter produces water and carbon(V) oxide. OR Candle contains carbon and hydrogen / candle is a hydrocarbon	(1 mark) (3 marks)
22.		 <p style="text-align: right;">½ mark each to a maximum of 3</p>	(3 marks)
23.		A non -luminous flame is invisible, hence it should be put off to avoid being accidentally burned.	(2 marks)
24.	(a)	- Haematite; - Magnetite; - Siderite. (Any 2 correct @ ½ mark)	(1 mark)
	(b)	- Weigh the Iron(III) oxide together with a crucible; - Heat the Iron(III) oxide and coke to a constant mass; - Cool and re-weigh residue and crucible - The difference in mass is weight of the iron.	(½ mark) (½ mark) (½ mark) (½ mark) (3marks)

No.	Responses	Marks
25.	A solution of sodium chloride contains ions which are free to conduct electricity while that of sugar contains molecules hence cannot conduct electricity.	(2 marks)
26.	<ul style="list-style-type: none"> - The composition of commercial indicators remains constant. hence gives consistent results. > The composition of flower extracts change with time giving inconsistent results. 	(2 marks)
27.	<p>(a) R.F.M of $(NH_4)_2HPO_4 \Rightarrow (14 \times 2 + (9 \times 1) + 31 + (16 \times 4))^{1/2}$ $= 28 + 9 + 31 + 64$ $= 132^{1/2}$ 31g of P \rightarrow 132 20000g \rightarrow ? $\frac{20,000}{132} \times 31 = 4697g = 4.697kg$</p> <p>(b) $(NH_4)_2HPO_4$, has two nutrients available to crops, nitrogen and phosphorus, urea has only nitrogen.</p>	<p>(1 mark)</p> <p>(1 mark)</p> <p>(1 mark)</p> <p>(3marks)</p>
28.	Empirical formula shows the simplest whole number ratio of the moles of atoms of different elements in a compound while the molecular formula shows the actual number of atoms of various elements present in one molecule of the compound.	<p>(1 mark)</p> <p>(1 mark)</p> <p>(2 marks)</p>