


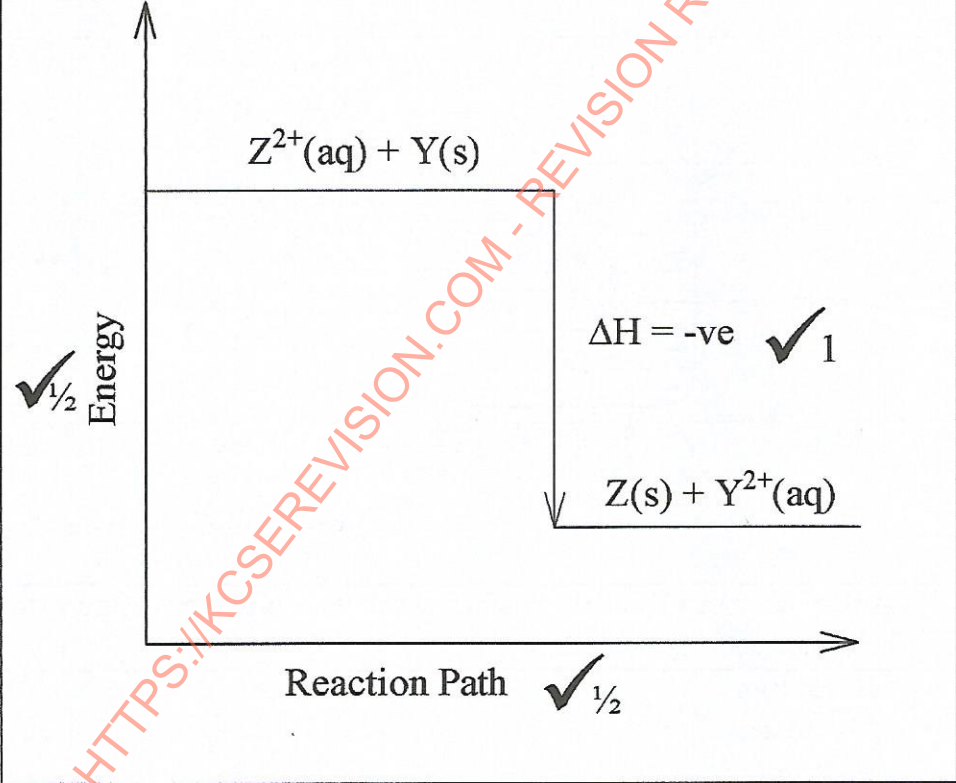
4.7 CHEMISTRY (233)

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>(½mark)</p> <p>(½ mark)</p> <p>(½mark)</p> <p>(½mark)</p> <p style="text-align: center;">(3 marks)</p>
8.	<p>(a) Carbonate (CO_3^{2-})</p> <p>(b) $\text{Ba}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \rightarrow \text{BaCO}_3(\text{s})$</p> <p>(c) - Making soft drinks/aerated drinks; - In refrigeration; - In extinguishing fires; - Making baking powder; 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.	<p>(a) Chromatography/paper chromatography</p> <p>(b) Q</p> <p>(i) S</p> <p>(ii)</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 filings to form rust. 	<p>(½ mark) (½ mark) (3 marks)</p>
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. 	<p>(1 mark) (½ mark) (½ mark) (½ mark) (½ mark) (3 marks)</p>
12.	(a) (b)	<p>Polythene / Polyethene</p> <p>It is non-biodegradable, hence pollutes the environment.</p>	<p>(1 mark) (2 marks) (3 marks)</p>
13.	(a) (b)	<p>No effect/does not affect the position of the equilibrium.</p> <p>Forward reaction is exothermic, excessive temperatures would favour the backward reaction therefore lowering the yield of ammonia.</p>	<p>(1 mark) (2 marks) (3 marks)</p>
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. 	<p>(1 mark) (1 mark) (1 mark) (3 marks)</p>
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. 	<p>(½ mark) (1 mark) (½ mark) (½ mark) (3 marks)</p>
16.	(a) (b) (c)	<p>Salt bridge</p> <ul style="list-style-type: none"> - Provides electrical contact between the electrodes//completes the circuit; - Provides cations and anions to replace those used up. <p>(Any 1 correct @ 1 mark)</p> <p>e.m.f of cell = E^\ominus reduced - E^\ominus oxidized</p> <p>= $-0.13 - -0.76$</p> <p>= $+0.63V$</p>	<p>(1 mark) (1 mark) (½ mark) (½ mark) (3 marks)</p>

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)

