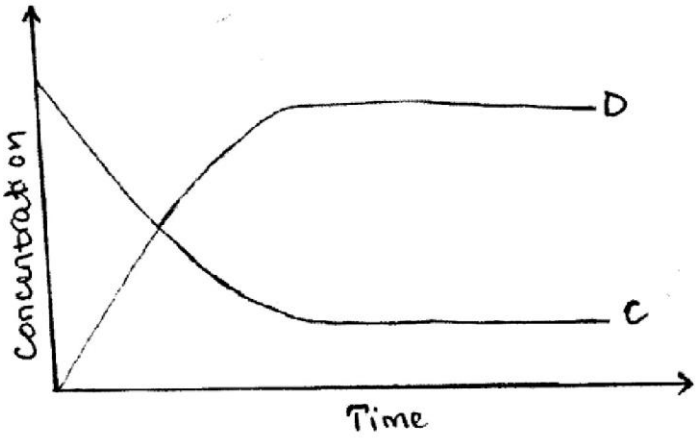
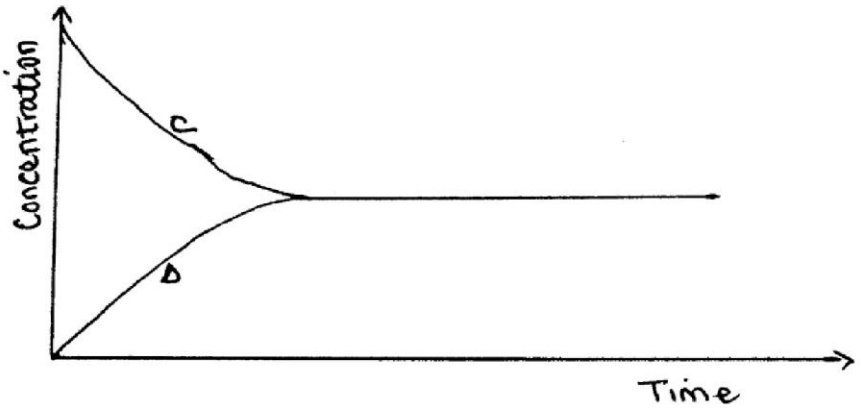
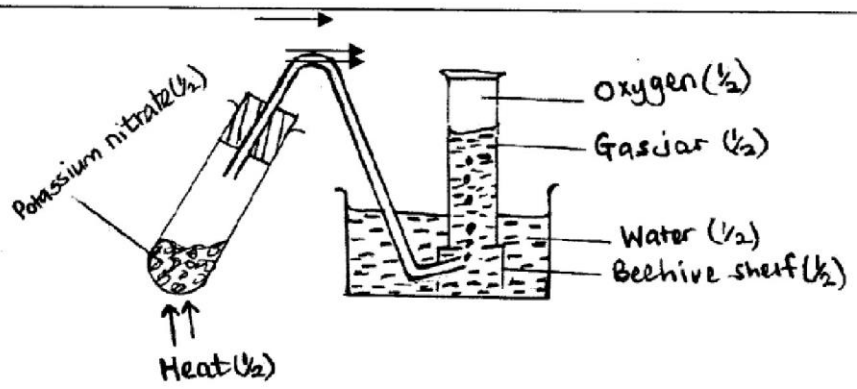
4.7 CHEMISTRY (233)

4.7.1 Chemistry Paper 1 (233/1)

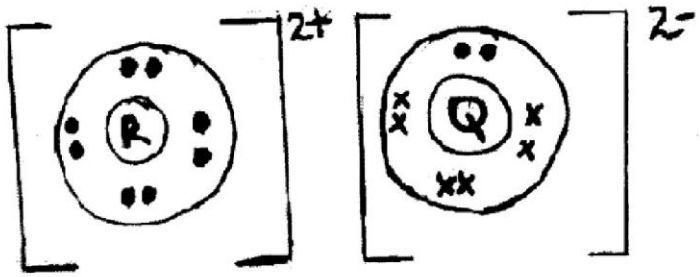
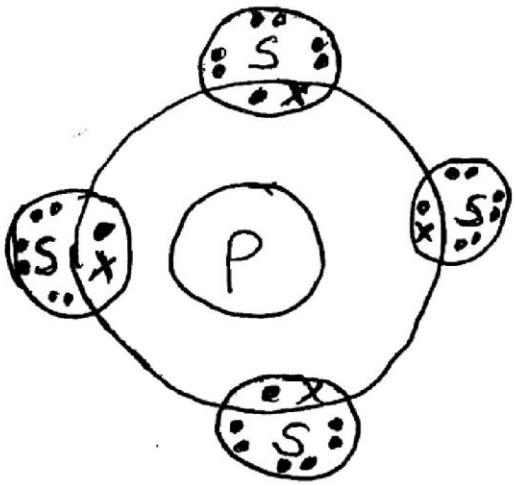
#		Responses	Marks
1.	(a)	- Ionisation energy decreases down the group 1 elements. - This is because atomic radii increases from A to **C** (down the group) /outermost electron is far from nucleus hence requires less energy to be lost during reaction.	(1 mark) (1 mark)
	(b)	Electron configuration of ion of **C**- 2.8.8	(1 mark)
2.		$x = 231$	(1 mark)
		$y = 90$	(1 mark)
3.	(a)	Carbon electrode (Anode) / Graphite electrode.	(1 mark)
	(b)	To allow movement of ions / to have it as an electrolyte. When dry, the ions are immobile.	(1 mark)
	(c)	It is the cathode / negative electrode.	(1 mark)
4.	(a)	To ensure all the oxide was reduced.	(1 mark)
	(b)	Mass of oxygen 6.69 – 6.21 = 0.48g Pb O $\frac{6.21}{207}$ $\frac{0.48}{16}$ $\frac{0.03}{0.03}$ $\frac{0.03}{0.03}$ 1 : 1 **E.F - PbO**	(½ mark) (½ mark) (½ mark) (½ mark)
5.	(a)	**B** is sodium propanoate Accept formula : C_2H_5COONa / CH_3CH_2COONa	(1 mark)
	(b)	$2C_2H_{6(g)} + 7O_{2(g)} \rightarrow 4CO_{2_{(g)}} + 6H_2O_{(l)}$	(1 mark)
	(c)	• as Fuel,	(1 mark)

#		Responses	Marks
		• production of ethene gas, • production of hydrogen gas.	
6.	(a)	**Charles' Law** The volume of a fixed mass of a gas is directly proportional to the absolute temperature at constant pressure.	(1 mark)
	(b)	As the volume decreases, there is increased bombardment / collisions of the molecules against the walls of the container, hence increased pressure.	(2 marks)
7.		• Add aqueous barium nitrate / barium chloride to sample; Followed by dilute nitric(V) acid or HCl; • If white precipitate persists, then SO_4^{2-} ions are present; • If the precipitate dissolves then SO_4^{2-} ions are absent. **OR** • Add lead(II) nitrate solution	(1 mark) (1 mark) (½ mark) (½ mark)
8.	(a)	The concentrations of reactants and products remain constant or Rate of forward reaction is equal to the rate of backward reaction.	(1 mark)
	(b)	 OR	(1 mark) (1 mark)

#		Responses	Marks
			
9.	(a)(i)	$Cu(OH)_2(s) + 4NH_3(aq) \rightarrow [Cu(NH_3)_4]^{2+}(aq) + 2OH^-(aq)$ **OR** $Cu^{2+}(aq)_+ 4NH_3(aq) \longrightarrow [Cu(NH_3)_4]^{2+}(aq)$	(1 mark)
	(ii)	Tetraamine copper(II)ion	(1 mark)
	(b)	CH_4 is a hydrocarbon, non-polar hence does not ionize in water. HCl is polar hence ionizes in water.	(½ mark) (½ mark)
10.		Molar mass of ethanoic acid (CH_3COOH) = 60g Mass of ethanoic acid = 20 x 1.05g/cm^3 = 21g Moles of ethanoic = $\frac{21}{60}$ = 0.35 moles Molarity = $\frac{0.35}{400/1000}$ $= 0.875M$	(½ mark) (½ mark) (½ mark) (½ mark) (1mark)

#		Responses	Marks
11.	(a)	$2K + (5\times -2) = 0$ $2K = +10$ $K = +5$	(½ mark) (½ mark)
	(b)	Group 5	(1 mark)
12.		 • Heating - 1mark • method of collection -1 mark • workability-1mark	(3 marks)
13.		A dark grey / brown solid is deposited / the solution turns black; chlorine is more reactive / a stronger oxidizing agent than iodine; Therefore displaces it from a solution of its ions. **OR** $Cl_2(g) + 2I^-(aq) \longrightarrow 2Cl^-(aq) + I_2(S)$	(1 mark) (1 mark) (1 mark)
14.	(a)	Phosphorus and chlorine	(1 mark)
	(b)	$CaO_{(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + H_2O_{(l)}$	(1 mark)
	(c)	- used to neutralize acidic soil / liming; - drying agent; (Any 1 correct @ 1 mark)	(1 mark)

#		Responses	Marks
15.		To copper turnings, add 50% concentration H_2SO_4 or HNO_3 / Heat copper turnings to form copper(II) oxide and add dilute H_2SO_4 or HNO_3 or HCl ; To the resulting mixture, add excess sodium carbonate (soluble) Filter mixture; Rinse residue with water and dry between filter papers.	(1 mark) (1 mark) (½ mark) (½ mark)
16.		The mixture changed from green to yellow / formation of a brown gas; Iron(II) ions is oxidized by nitric(V) acid to Iron(III) ions / nitric(V) acid is reduced to nitrogen(II) oxide which is oxidized by oxygen to nitrogen(IV) oxide.	(1 mark) (1 mark)
17.	(a)	Sodium hydroxide solution or Potassium hydroxide solution;	(1 mark)
	(b)	$2Cu_{(s)} + O_{2_{(g)}} \rightarrow 2CuO_{(s)}$	(1 mark)
	(c)	Argon, Neon,(Inert gases)	(1 mark)
18.	(a)	Moderately concentration nitric(V) acid / 50% concentrated nitric(V) acid.	(1 mark)
	(b)	Colourless nitrogen(II) oxide (NO) is oxidized to brown nitrogen(IV) oxide (NO_2).	(1 mark)
	(c)	$3Cu\ (s) + 8HNO_3\ (aq) \rightarrow 3Cu\ (NO_3)_2\ (aq) + 4H2O + 2NO$	(1 mark)
19.	(a)	- Concentration of acid and base ; - Volume of acid used.	(½ mark) (½ mark)
	(b)	- Improves accuracy; - Polystyrene is a plastic and will not absorb heat /minimum heat loss;	(½ mark) (½ mark)
20.	(a)	**K** – Ethanoic acid / (CH_3COOH) **L** –Ethene	(1 mark) (1 mark)
	(b)	Acidified potassium dichromate(VI) **OR** acidified potassium manganate(VII)	(1 mark)

#		Responses	Marks
21.	(i)		(1 mark)
	(ii)		(1 mark)
	(b)	**R**and **Q** form an ionic compound with strong ionic bonds while **R** and **S** form a covalent compound with weak Van der Waals forces.	(½ mark) (½ mark)

#		Responses	Marks
22.	(a)	Inert electrode is one which does not participate in the reaction / does not affect the products of electrolysis / does not react;	(1 mark)
	(b)	Anode - chlorine;	(1 mark)
		Cathode - Hydrogen;	(1 mark)
23.		-Measure the boiling point / freezing point;	(1 mark)
		-If the boiling point /freezing point is sharp, then liquid is pure.	(1 mark)
24.	(a)	$4M_{(s)} + K_{2(g)} \rightarrow 2M_2K_{(s)}$ OR $4K(s) + O_2(g) \longrightarrow 2K_2O(s)$	(1 mark)
	(b)	**L**	(1 mark)
	(c)	**J** should be placed in period 3, group 5 of the periodic table.	(1 mark)
25.		- Graphite consists of layers of carbon atoms;	(1 mark)
		- The layers are held together by the weak Van der Waals forces of attraction;	(1 mark)
		- These layers therefore slide over each other thus preventing machine to machine contact.	(1 mark)
26.	(a)	Removal of original colour from a substance and the remaining substance is white / colourless ;	(1 mark)
	(b)	NaClO / NaOCl	(1 mark)
	(c)	Kill germs / bacteria / microorganisms	(1 mark)
27.	(a)	• rock salt /NaCl / trona ;	(½ mark)
		• salt petre/ $NaNO_3$.	(½ mark)
	(b)	To lower the melting point from 800°C to about 600°C;	(1 mark)
	(c)	• street lighting; • coolant in nuclear reactors; • extraction of titanium; • extraction of gold; • manufacture of sodium cyanide; • manufacture of sodium peroxide. (Any one correct @ 1mk)	(1 mark)
28.	(a)(i)	$>C=C<$ **OR** $-C\equiv C-$ absent Alkene, alkyne/ unsaturated hydrocarbon absent	(1 mark)
	(ii)	$-OH$ / $R-OH$ present	(1 mark)
	(b)	Lower a burning splint to the gas, a 'pop' sound should be produced showing it is hydrogen.	(1 mark)