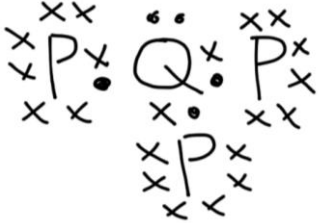


2014 Secondary Three
Mid Year Examination (Chemistry)
Section A

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

Section B

No	Answers	Marks
B1(a)	Nitrogen dioxide will fill up the gas jar in a lesser time [1] as it has a lower relative molecular mass (46) than Bromine(160) [1].	[1]
(b)	The reddish brown colour will be uniform in less than 30 minutes. [1] In hot water, the molecules will absorb the heat energy and gain kinetic energy thus they will be able to diffuse faster and thus spread in a shorter time. [1]	[2]
B2 (a)	(i) QP_3 (ii) RP(do not accept PR)	[2]
(b)	 Practise Error Carry Forward (E.C.F.) if actual symbols of elements used instead.	[1]
(c)	They are isotope of each other.	[1]
B3(a)	The R_f value of X is 0.5 in solvent A while the R_f value of X is 0.82 in solvent B . [1] Thus X is more soluble in solvent B than in the solvent A [1].	[2]
(b)	W : Glutamic acid	[1]
B4(a)	There are weak van der Waals /intermolecular forces of attraction between the layers of atoms. [1] Thus little forces are needed to slide the layers of atoms past one another [1], thus the boron nitride with structure A can be used as a lubricant.	[2]
(b)	Boron is bonded to nitrogen by strong covalent bond throughout the 3D structure, hence the boron nitride in structure B is very hard and it can be used as drill tips.[1]	[1]
B5(a)	$Na_2S_2O_5 + 2HA \rightarrow 2NaA + 2SO_2 + H_2O$	[1]

No	Answers	Marks
(b)	Weak acid is a substance that dissociate partially in water to provide H^+ ion. Accept: low concentration of H^+ ion / acid partially ionizes / partially separates into ions / “partly” Reject: H^+ dissociates or ionizes partially / Weak acid dissociates partially in water / Weak acid dissolves partially	[1]
(c)	$HA(aq) \rightleftharpoons H^+(aq) + A^-(aq)$ (Accept: Single-direction arrow)	[1]
(d)	Sulfur dioxide is an acidic oxide / an acid / acidic / a reducing agent. [1] Add sodium carbonate / any carbonate to the solution of sulfur dioxide, effervescence of colourless, odourless gas that will turns blue litmus red will be formed. When the gas is pass through limewater, it will give white precipitate. / Add any moderately reactive metals follow by test of hydrogen gas [1] Reject: any litmus, pH meter, indicator test / Acid + base or alkali (no observations, unless it is stated that an insoluble base is observed to dissolve)	[2]
B6(a)	Firstly add sodium carbonate (any Gp I or ammonium carbonate/hydroxide) to copper(II)sulfate. It will form copper(II)carbonate /copper(II)hydroxide. Filter the mixture to obtain copper(II)carbonate as residue. [1] Add nitric acid to copper(II)carbonate until it is in excess /no more copper(II) carbonate dissolve. Filter the mixture and crystallize the crystals [1] Reject: Titration with nitric acid (no reaction) / Collecting filtrate from ionic precipitation.	[2]
(b)	Before dilute sulfuric acid was added, <u>the barium ions and hydroxide ions are moving freely in the solution</u> , therefore the conductivity is high.[1] As more dilute sulfuric acid was added, <u>the dilute sulfuric acid reacts with aqueous barium hydroxide to form an insoluble salt, barium sulfate</u> , thus <u>decreasing the concentration of the free moving ions to zero</u> . [1] When the reaction has ended, as <u>excess dilute sulfuric acid</u> was added, the <u>hydrogen ions and sulfate ions move freely in the acidic solution</u> , therefore the conductivity increases again.[1] Accept: • Mobile ions (for barium hydroxide and sulfuric acid) • Aqueous ionic compound can conduct electricity • Acid can conduct electricity • Water and solid barium sulfate / barium sulfate precipitate / insoluble barium sulfate / barium sulfate crystal cannot conduct electricity	[3]

No	Answers	Marks
	Reject: - Neutral solution cannot conduct electricity - Any links of pH to electrical conductivity without stating acidic / alkaline solution - No mobile charged ions after neutralization (Why? Some salts, if soluble, can still conduct electricity after neutralization.) - Mobile electrons (No metal or graphite)	
(c)	Filter the mixture. Barium sulfate is retained on the filter paper as residue.[1] <u>Wash the residue with distilled water</u> to obtain a pure sample of barium sulfate.[1] Accept: - Distilled water is not mentioned. - Filtrate is used instead of filter but solid / residue / insoluble salt / crystal is mentioned for washing Reject: - Filtrate is used instead of filter without mentioning if filtrate or residue is collected. - Filter is mentioned followed by washing but not specified if filtrate or residue is washed.	[2]
B8(a)	Nitrate ion and Sodium ion/(any cation ion that will not give a brown compound).[1] (Mark will be given for those answer that state the it will not give colourless odourless gas) Ammonia ion is rejected. As all compound that contain nitrate and sodium ion are soluble, it cannot be present in E as it is an insoluble compound[1]	[2]
(b)	Iron(III)carbonate/ $\text{Fe}_2(\text{CO}_3)_2$ (no marks if the answer is Iron carbonate)	[1]
(c)	ECF from (b) $\text{Fe}_2(\text{CO}_3)_2 (\text{s}) + 6\text{H}^+ (\text{aq}) \rightarrow 2\text{Fe}^{3+} (\text{aq}) + 3\text{H}_2\text{O} (\text{l}) + 3\text{CO}_2 (\text{g})$	[1]
C9(a)	P contains Cu^{2+} [1] Q contains NH_4^+ [1] Only accept formulas, overall deduct 1m if answer is name. Overall deduct 1m if there is no indication of which cation is in P or Q.	[2]
(b)	R contains Cl^- [1] S contains CO_3^{2-} [1]	[2]

No	Answers	Marks
	Only accept formulas, overall deduct 1m if answer is name. Overall deduct 1m if there is no indication of which cation is in P or Q.	
(c)	R is ammonium chloride [1] and S is copper(II) carbonate [1]. Formulas accepted.	[2]
(d)	$\text{Cu}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Cu}(\text{OH})_2(\text{s})$ Ecf from (a)	[1]
(e)	Moist red litmus remains red/ no visible change [1]. Carbon dioxide is an acidic oxide [1]. Reject: Carbon dioxide turns moist blue litmus red	[2]
(f)	No visible change. /No precipitate. Reject: Ammonia gas produced upon warming. Ecf from (c)	[1]