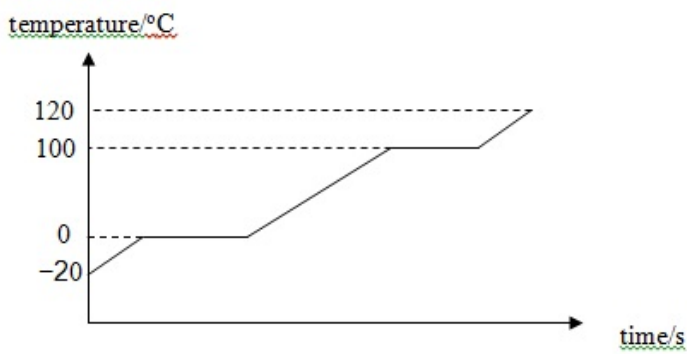


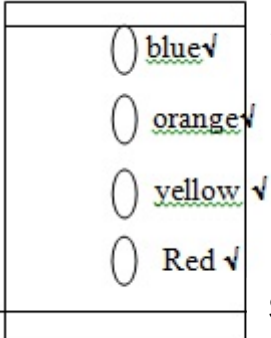
2015 Sec 3 Mid-Year Chemistry Answers

Section A

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

Section B

No	Answers	Marks
B1(a)	Boiling of water occurs at 100°C only but evaporation can occur at temperatures below the boiling point. OR Boiling of water occurs throughout the whole liquid but evaporation occurs only at the surface of the water. OR Boiling occurs rapidly while evaporation occurs slowly.	[1]
B1(b)		[1]
B1(c)	The relative molecular masses of carbon monoxide and nitrogen are the same. Hence the rate of diffusion of carbon monoxide out of the porous pot is the same as that of nitrogen into the porous pot.	[1] [1]

No	Answers	Marks
B1(d)	The water molecules occupy the spaces between the ethanol molecules. OR The ethanol molecules occupy the spaces between the water molecules. OR Ethanol and water are miscible liquids.	[1]
B2(a)(i)	chromatography	[1]
B2(a)(ii)	4	[1]
B2(a)(iii)	blue	[1]
B2(b)	 Solvent front Starting line There must be equal spacing between the spots because the successive coloured circles are equidistant from each other. 4✓ [2] 2-3✓ [1] 1 ✓ [0]	[2]
B3(a)	Isotopes are atoms of the same element with the same number of protons but different number of neutrons.	[1]
B3(b)	4	[1]
B3(c)	Relative atomic mass = $4.30/100 \times 50 + 73.80/100 \times 52 + 19.50/100 \times 53 + 2.40/100 \times 54 = 52.16$ Identity of element X = Cr (chromium)	[1]
B3(d)	It is an average value of the masses of all the isotopes.	[1]
B4(a)	P: CO ₂ Q: CaO R: Ca(OH) ₂ Accept: chemical names	[3]

No	Answers	Marks
B4(b)	Bubble the gas into aqueous calcium hydroxide. OR Bubble the gas into solution R .	[1]
B4(c)	Calcium oxide (dissolves in water to produce OH^- ions which) reacts with ammonium salts to produce ammonia gas. [1] Hence, nitrogen is lost from the soil.	[1] [1]
B4(d)	Add excess Q to dilute nitric acid/ hydrochloric acid until it stops dissolving. (✓) Filter the mixture. (✓) Add any aqueous ammonium or Group I carbonate to the filtrate. (✓) Filter the mixture again. (✓) Wash the residue with distilled water. (✓) Dry the residue between sheets of filter paper. (✓) 0-1✓ [0] 2✓ [1] 3-4✓ [2] 5-6✓ [3]	[3]
B4(e)(i)	A dibasic acid is one that produces two moles of H^+ ions per mole of acid molecules.	[1]
B4(e)(ii)	KHCO_3 , K_2CO_3	[2]
B5(a)	$\text{Al}(\text{NO}_3)_3$ Accept: chemical name	[1]
B5(b)	$\text{Al}^{3+}(\text{aq}) + 3\text{OH}^-(\text{aq}) \rightarrow \text{Al}(\text{OH})_3(\text{s})$	[1]
B5(c)	C can only ionize in the presence of water to form OH^- ions which cause the red litmus to turn blue.	[1]

C6(a)	Copper(II) carbonate, CuCO_3	[1]
C6(b)(i)	Step 5	[1]
C6(b)(ii)	Step 2	[1]
C6(b)(iii)	Step 3	[1]
C6(c)	$\text{CuCO}_3 + 2\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{H}_2\text{O} + \text{CO}_2$	[1]
C6(d)(i)	NaOH / KOH	[1]
C6(d)(ii)	$\text{Cu}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Cu}(\text{OH})_2(\text{s})$	[2]
C6(d)(iii)	$\text{Cu}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{CuCl}_2 + 2\text{H}_2\text{O}$	[1]
C6(d)(iv)	Neutralisation	[1]