DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department of Curriculum Management
Educational Assessment Unit

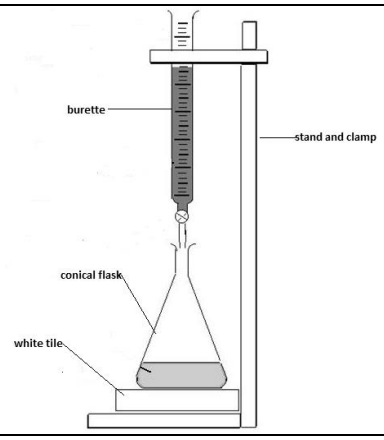
Track 3

Annual Examinations for Secondary Schools 2014

FORM 4 CHEMISTRY MARKING SCHEME

Question		Requirement	Marks	Additional Guidelines
1a.	(i)	Sodium	1	Accept any reasonable answer.
	(ii)	Carbon	1	
	(iii)	Iron	1	Accept any reasonable answer.
	(iv)	Bromine	1	Also accept mercury.
	(v)	Fluorine	1	
1b.	(i)	Cs	1	
	(ii)	Be	1	
	(iii)	Fe	1	Also accept Co and Ni.
	(iv)	K	1	Accept any other alkali metal.
	(v)	Cu	1	Also accept aluminium.
2a.		Grey black	1	Accept dark grey.
2b.		Purple	1	Accept violet.
2c.		Red	1	
2d.		Blue	1	
2e.		Golden yellow	1	
2f.		White	1	
2g.		Brown	1	
2h.		White	1	
2i.		Green	1	
2j.		Brown	1	
3a.	(i)	sodium, magnesium, zinc, iron, copper	1	
	(ii)	Iron and copper	1	
	(iii)	Coating of a metal with a thin layer of a less reactive metal to protect it from corrosion	3	Coating (1 mark) less reactive metal (1mark) protect it from corrosion (1mark)
3b.	(i)	fluorine, chlorine, bromine, iodine	1	
	(ii)	They react by gaining electrons.	1	Accept any reasonable answer such as reference to physical properties.
	(iii)	Chlorine is smaller so there is less distance between outer shell and nucleus. Chlorine has fewer electrons and therefore less shielding.	2	
	(iv)	Potassium fluoride is an ionic substance and therefore it is soluble.	1	Other potassium halides are soluble so likewise KF is soluble.

4a.		Haber, nitrogen, hydrogen, 200, iron, 450	3	½ mark each
4b.		$3H_2 + N_2 \rightleftharpoons 2NH_3$	2	1 mark if all formulae are correct 1 mark if all balancing is correct
4c.		Ammonia changes the colour of damp red litmus paper to blue.	2	It forms white clouds when it comes in contact with concentrated hydrochloric acid fumes.
4d.	(i)	$NH_3 + HNO_3 \rightarrow NH_4NO_3$	2	1 mark if all formulae are correct 1 mark if all balancing is correct
	(ii)	Fertilizer	1	Accept any reasonable answer.
5a.	(i)	2,8,1	1	
	(ii)	The number of electrons in the last shell shows the group to which it belongs.	1	
	(iii)	It decreases from left to right.	1	
	(iv)	It reacts with both acids and alkalis.	1	
5b.		$SiCl_4$ Na_2O SCl_2	3	
5c.	(i)	Nitrogen dioxide	1	Accept carbon dioxide.
	(ii)	4	1	Accept pH from 3-5.
	(iii)	Erosion of limestone facades	1	Accept any reasonable answer.
6a.		A= copper (II) carbonate B= copper (II) oxide C= copper (II) nitrate D= copper (II) hydroxide	4	1 mark each name Deduct ½ mark when oxidation state of copper is missing. Do not accept formulae.
6b.	(i)	$CuCO_3(s) \rightarrow CuO(s) + CO_2(g)$	3	1 mark if all formulae are correct 1 mark if all balancing is correct (and formulae are correct too) 1 mark if all state symbols are correct ½ mark if only 1 state symbol is incorrect
	(ii)	$Cu(NO_3)_2(aq) + 2NaOH(aq) \rightarrow Cu(OH)_2(s) + 2NaNO_3(aq)$	3	1 mark if all formulae are correct 1 mark if all balancing is correct (and formulae are correct too) 1 mark if all state symbols are correct ½ mark if only 1 state symbol is incorrect

7a.	(i)	$H_2SO_4 + 2NaOH \rightarrow 2H_2O + Na_2SO_4$	2	1 mark if all formulae are correct 1 mark if all balancing is correct
	(ii)	1. Wash burette with tap water and distilled water. Finally rinse with the NaOH and fill with solution. 2. Place 3 drops indicator in each of the conical flasks previously filled with the acid. 3. Place conical flasks under burette and open the tap. 4. Keep pouring in the alkali until the colour of the solution changes to light pink. Note volume of alkali used. 5. Repeat with the other three solutions.	1 1 1 1 1	Accept any similar method.
	(iii)		4	2 marks for diagram ½ mark for each label
	(iv)	The colour of the solution changes from colourless to light pink.	1	
7b.	(i)	19.55 cm^3, 19.40 cm^3, 19.30 cm^3, 19.35 cm^3	2	½ mark for each number
	(ii)	$\frac{19.40 + 19.30 + 19.35}{3} = 19.35 cm^3$	2	1 mark for working 1 mark for correct answer
	(iii)	1. 0.5 moles H_2SO_4 in 1000 cm^3 ? moles H_2SO_4 in 25 cm^3 $\frac{0.5 \times 25}{1000} = 0.0125$ moles 2. Ratio of acid : alkali = 1:2 0.0125 moles H_2SO_4 react with 0.0125x2 moles of NaOH = 0.025 moles 3. 0.025 moles NaOH in 19.35 cm^3 ? moles NaOH in 1000 cm^3 $\frac{0.025 \times 1000}{19.35} = 1.29$ mol dm^{-3}	4	1 mark for each step (x3) 1 mark for correct answer and units Allot full marks if 7b(ii) is incorrect but all working is correct.
8a.	(i)	Electroplating	1	
	(ii)	The cathode is the negative electrode. It attracts the positively charged silver ions. Silver will be deposited on the cathode.	3	Accept any reasonable answer.
	(iii)	Flow of ions	1	

	(iv)	Ag^+, NO_3^-, H^+, OH^-.	2	½ mark each
8b.	(i)	$Ag - e^- \rightarrow Ag^+$ NO_3^- and OH^- are also attracted to the anode but are not discharged. Ag dissolves and ionizes as less energy is required.	4	2 marks for half equation 2 marks for explanation
	(ii)	$Ag^+ + e^- \rightarrow Ag$ Ag^+ and H^+ are both attracted to the cathode. Ag^+ is discharged as it is lower in the ECS.	4	2 marks for half equation 2 marks for explanation
8c.	(i)	Q=It Q = 0.5 x 1.5 x 60 x 60 = 2700 C	2	1 mark for working 1 mark for correct answer
	(ii)	96500 C produce 108 g of silver 2700 C produce ? g of silver $\frac{2700 \times 108}{96500} = 3.02$ g	3	1 mark for reasoning 1 mark for working 1 mark for correct answer
9a.	(i)	The magnesium burned with a dazzling bright white flame.	1	
	(ii)	She should not look directly at the flame for a long time.	1	Accept any other reasonable precaution.
	(iii)	$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$	3	1 mark if all formulae are correct 1 mark if all balancing is correct (and formulae are correct too) 1 mark if all state symbols are correct ½ mark if only 1 state symbol is incorrect
	(iv)	Mg loses electrons therefore it is oxidized. Oxygen gains electrons so it is reduced.	4	2 marks for each explanation
9b.	(i)	Weigh a clean dry watch-glass on an electronic balance. Place all the oxide in the watch-glass and weigh again. Subtract the initial mass from the final mass.	1 1 1	Accept any other reasonable method.
	(ii)	40 g of MgO = 1 mole 8 g of MgO = ? $\frac{8 \times 1}{40} = 0.2$ moles From equation, ratio Mg : MgO is 1 : 1 Therefore 0.2 moles MgO are produced from 0.2 moles of Mg. 1 mole of Mg = 24 g 0.2 moles = ? $\frac{0.2 \times 24}{1} = 4.8$ g	1 1 1	

	(iii)	Ratio of Mg:O_2 = 2:1 $\frac{0.2}{2}$ = 0.1 moles of O_2 1 mole of any gas occupies 22.4 dm^3 0.1 moles of O_2 occupy ? $\frac{0.1 \times 22.4}{1}$ = 2.24 dm^3	1 1	
	(iv)	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$ $\frac{2.24}{273} = \frac{V_2}{333}$ $V_2 = \frac{2.24 \times 333}{273} = 2.73\ dm^3$	3	1 mark for equation 1 mark for working 1 mark for correct answer