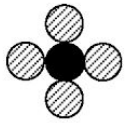
Mark Scheme - 3

1.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	calcium and chlorine (1) copper(II) oxide / copper oxide (1) $MgBr_2$ (1)		Ca and Cl / Cl_2	
(b)	(i)		1	carbon ● oxygen ○ both needed			
	(ii)	I	1				
		II	1		follow through (ft) from (b)(i)		

2.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	mass carbon and hydrogen divided by respective A_r values e.g. carbon 9/12 and hydrogen 2/1 (1) ratio of 3:8 (1) C_3H_8 (1) ecf possible if formula given is an alkane award (1) mark only for correct answer with no working			
(b)			2	$M_r(C_4H_{10})$ = 58 (1) (48/58) × 100 = 82.76 (1) consequential marking	82.8 / 83		

3.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
			3	sodium bromide (1) hydrogen, sulfur and oxygen (1) K_2O (1)		H, S and O	

4.

Sub-section			Mark	Answer		Accept	Neutral answer	Do not accept
			4	NH_4^+	(1)			
				Li_2SO_4	(1)	$Li^+{}_2SO_4^{2-}$		
				$Pb(NO_3)_2$	(1)	$Pb^{2+}(NO_3^-)_2$		
				HCO_3^-	(1)			

5.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	sodium and chloride Na^+ and Cl^-			chlorine Na / Cl
	(ii)		1	NaCl	Na^+Cl^-		
(b)			1	too little present / concentration very small / concentration of iodide ions much smaller than that of chloride / it would take a lot of seawater to get a small amount of iodide from it	reference to chlorine / iodine	reference to cost or energy quoting numbers from table	

6.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	$Ba(OH)_2$ (1) Fe^{3+} (1) HPO_4^{2-} (1)			
(b)			2	sodium loses an electron (1) bromine gains an electron (1)	electrons transferred (1)		

7.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	$AlCl_3$ (1) formula must be correct to get balancing mark 2,3,2 (1)			
(b)	(i)		2	102 (2) if incorrect allow (1) for (27 x 2) + (16 x 3) no ecf within part (i)			
	(ii)		1	47 ecf possible from part (i)	47.1		

8.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	sodium atom 1 chlorine atom 7 both needed			
	(ii)	I	2	sodium (atom) loses one electron (1) chlorine (atom) gains one electron (1) award (2) for electron transferred from sodium to chlorine maximum (1) if transfer of more than 1 electron implied			
		II	1	sodium chloride / NaCl			
(b)			2	23 + 35.5 + 3(16) (1) 106.5 (1) award (2) for cao no ecf			

9.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	Na_2SO_4			
	(ii)		1	ammonium fluoride ammonium sulfate magnesium fluoride magnesium sulfate - any two for one mark	NH_4F $(NH_4)_2SO_4$ MgF_2 $MgSO_4$		
(b)			2	B (1) contains the most fluoride (1)		**lot** of fluoride	fluorine

10.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	2, 8, 8			
	(ii)		1	D		Al	
	(iii)		2	B and D – both needed (1) they have the same number of electrons in their outer shell / they both have three electrons in their outer shell (1) 2nd mark may be awarded if A and C given	boron and aluminium		A and C
(b)	(i)		1	40			
	(ii)		2	16 ÷ 40 (1) 40 (1) error carried forward from (i) correct answer only (2)			

11.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	moles =conc × vol/1000 $= \frac{0.1 \times 17.5}{1000}$ (1) = 0.00175 (1) award (2) for cao			
(b)			1	176			
(c)			2	ecf possible from parts (a) and (b) mass = moles × M_r = 0.00175 ×176 (1) 0.308 g /308 mg (correct unit required) therefore statement incorrect (1)	alternative method using given 300 mg mass		

12.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	(silicon difficult to classify) because it has metallic and non-metallic properties (1) response clearly indicating one or more metallic property and contrasting non-metallic property, e.g. it has a high melting point/boiling point like a metal but is brittle like a non-metal (2)	semi-metal / metalloid		it is a metal and a non-metal
(b)			1	Mg (ignore atomic number / mass number)		magnesium	
(c)	(i)		1	2			
	(ii)		1	Ag_2O	$Ag^+{}_2O^{2-}$		
(d)	(i)		1	antibacterial / antiviral / antifungal	kills germs / kills bacteria / antiseptic	disinfectant reduces smells	
	(ii)		1	silver nanoparticles can get into drinking water / water supplies / lakes / rivers could be dangerous to health / harmful / toxic don't know the effect / long term effect not known *uncertainty* must *be implied*		reference to the air / atmosphere / rain pollutes water / the environment	

13.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	calcium, oxygen and hydrogen (1) Na_2CO_3 (1) $Ca(NO_3)_2$ (1)			
(b)			1	$H_2C_2O_4$	symbols in any order		

14.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	 *atoms must be touching*			
	(ii)		1	NH_3	H_3N		
(b)	(i)		1	O_2 / He / Ne *any **two***	oxygen / helium / neon		O
	(ii)		1	CO_2 / CH_4 / SO_2 *any **two***	carbon dioxide / methane / sulfur dioxide		
(c)	(i)		1	1			
	(ii)		1	5			
(d)	(i)		1	Mg^{2+} Cl^- ***both** ions needed (including charges)*	$2Cl^-$		Cl^-_2
	(ii)		1	NaOH	Na^+OH^-		