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Mark Scheme (Results)
Summer 2008

GCE

GCE O Level Chemistry

7081/01

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7081/01 O Level Chemistry Mark Scheme – June 2008

Question Number	Acceptable Answers	Reject	Mark
1 (a)	BaO		**(1)**

Question Number	Acceptable Answers	Reject	Mark
1 (b)	Sulphur dioxide / sulphur(IV) oxide		**(1)**

Question Number	Acceptable Answers	Reject	Mark
1 (c)	Potassium carbonate		**(1)**

Question Number	Acceptable Answers	Reject	Mark
1 (d)	$CH_2=CH_2$ / C_2H_4 / CH_2CH_2 / $H_2C=CH_2$		**(1)**

Question Number	Acceptable Answers	Reject	Mark
1 (e)	Iron(III) oxide/ferric oxide		**(1)**

Question Number	Acceptable Answers	Reject	Mark
1 (f)	$Al_2(SO_4)_3$		**(1)**

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
2 (a)	• Sodium • 10 • 2.8.6		**(1)** **(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
2 (b)(i)	Sulphur /S		**(1)**

Question Number	Acceptable Answers	Reject	Mark
2 (b)(ii)	Sodium/Na		**(1)**

Question Number	Acceptable Answers	Reject	Mark
2 (b)(iii)	Neon/Ne		**(1)**

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
3 (a)	Phosphorus / P		**(1)**

Question Number	Acceptable Answers	Reject	Mark
3 (b)	Iodine / I_2		**(1)**

Question Number	Acceptable Answers	Reject	Mark
3 (c)	Oxygen / O_2		**(1)**

Question Number	Acceptable Answers	Reject	Mark
3 (d)	Sulphur / S_8		**(1)**

Question Number	Acceptable Answers	Reject	Mark
3 (e)	Bromine/Iodine / Br_2 /I_2		**(1)**

Question Number	Acceptable Answers	Reject	Mark
3 (f)	Argon / Ar		**(1)**

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
4 (a)	blue		**(1)**

Question Number	Acceptable Answers	Reject	Mark
4 (b)	black		**(1)**

Question Number	Acceptable Answers	Reject	Mark
4 (c)	green		**(1)**

(Total 3 Marks)

Question Number	Acceptable Answers	Reject	Mark
5 (a)	Reduction		**(1)**

Question Number	Acceptable Answers	Reject	Mark
5 (b)	Not oxidation or reduction		**(1)**

Question Number	Acceptable Answers	Reject	Mark
5 (c)	Redox		**(1)**

Question Number	Acceptable Answers	Reject	Mark
5 (d)	Not oxidation or reduction		**(1)**

Question Number	Acceptable Answers	Reject	Mark
5 (e)	Redox		**(1)**

Question Number	Acceptable Answers	Reject	Mark
5 (f)	Oxidation		**(1)**

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
6 (a)	11		**(1)**

Question Number	Acceptable Answers	Reject	Mark
6 (b)	3		**(1)**

Question Number	Acceptable Answers	Reject	Mark
6 (c)	3		**(1)**

Question Number	Acceptable Answers	Reject	Mark
6 (d)	2		**(1)**

Question Number	Acceptable Answers	Reject	Mark
6 (e)	60		**(1)**

Question Number	Acceptable Answers	Reject	Mark
6 (f)	0.01		**(1)**

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
7 (a)(i)	S^{2-} / P^{3-}		**(1)**

Question Number	Acceptable Answers	Reject	Mark
7 (a)(ii)	K^{+} / Ca^{2+} / Sc^{3+} / Ti^{4+}		**(1)**

Question Number	Acceptable Answers	Reject	Mark
7 (b)	• 4 single electron pair bonds correct • Remaining outer electrons correct on all atoms *(Second mark can only be scored if first mark awarded)* (Can be all dots or all crosses)		**(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
7 (c)(i)	Allotropes		**(1)**

Question Number	Acceptable Answers	Reject	Mark
7 (c)(ii)	• Diamond has strong covalent bonds (between all the atoms) / each carbon atom is covalently bonded to four other carbon atoms **or** diamond has a rigid tetrahedral structure / is a tetrahedral macromolecule • Graphite has weak forces/ van der Waals forces between layers / hexagonal rings **or** Graphite <u>layers</u> are able to slide	any reference to intermolecular forces scores 0/1 particles slide over one another	**(1)** **(1)**

(Total 7 Marks)

Question Number	Acceptable Answers	Reject	Mark
8 (a)	• e.g. hydrogen peroxide / H_2O_2 and manganese(IV) oxide /manganese dioxide/MnO_2		**(1)**
	• Relights a <u>glowing</u> splint	lighted splint burns brighter	**(1)**

Question Number	Acceptable Answers	Reject	Mark
8 (b)	• Mg/Zn/Fe and (dilute) hydrochloric acid/HCl /sulphuric acid/H_2SO_4 / concentrated hydrochloric acid Accept calcium and water	concentrated H_2SO_4	**(1)**
	• Pops with a lighted splint / burns with a pop	glowing splint gives a pop	**(1)**

Question Number	Acceptable Answers	Reject	Mark
8 (c)	• Any specified metal carbonate/ $NaHCO_3$ / $KHCO_3$ and (dilute) hydrochloric acid/sulphuric acid/nitric acid *(accept name or correct formula)* • Add to lime water/calcium hydroxide (solution) turns milky/forms white ppt. /turns cloudy	concentrated sulphuric acid	**(1)** **(1)**

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
9 (a)	39.5 (allow 39-40)		**(1)**

Question Number	Acceptable Answers	Reject	Mark
9 (b)	33.5 (allow 33-34)		**(1)**

Question Number	Acceptable Answers	Reject	Mark
9 (c)	43 °C (allow 42-44)		**(1)**

Question Number	Acceptable Answers	Reject	Mark
9 (d)(i)	crystals would form at the same temperature		**(1)**

Question Number	Acceptable Answers	Reject	Mark
9 (d)(ii)	If cooled slowly, crystals would be larger / if cooled quickly, crystals would be smaller		**(1)**

(Total 5 Marks)

Question Number	Acceptable Answers	Reject	Mark
10 (a)	HCO_3^-		**(1)**

Question Number	Acceptable Answers	Reject	Mark
10 (b)	OH^-		**(1)**

Question Number	Acceptable Answers	Reject	Mark
10 (c)	SO_4^{2-}		**(1)**

Question Number	Acceptable Answers	Reject	Mark
10 (d)	Br^-		**(1)**

Question Number	Acceptable Answers	Reject	Mark
10 (e)	NO_3^-		**(1)**

Question Number	Acceptable Answers	Reject	Mark
10 (f)	O^{2-}		**(1)**

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
11 (a)	81		**(1)**

Question Number	Acceptable Answers	Reject	Mark
11 (b)	(4.05/81 =) 0.05		**(1)**

Question Number	Acceptable Answers	Reject	Mark
11 (c)	volume = moles/concentration ∴ volume = 0.05/2 (allow t.e.) = 0.025 dm^3 or 25 cm^3 Answer without working scores (1)		**(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
11 (d)	M_r ($ZnSO_4$) = 161 mass = 161 x 0.05 = 8.05 g (allow t.e.)		**(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
11 (e)(i)	14.35 – 8.05 (or answer in d) = 6.30 g		**(1)**

Question Number	Acceptable Answers	Reject	Mark
11(e)(ii)	8.05/161 : 6.30/18 0.05 : 0.35 1 : 7 **or** $M_r(ZnSO_4.xH_2O)$ = 161 x 14.35/8.05 = 287 mass water = 126 moles = 126/18 = 7 **or** $M_r(ZnSO_4.xH_2O)$ = 14.35/0.05 = 287 161 + 18*x* = 287 18*x* = 126 *x* = 7		**(1)** **(1)** **(1)** **(1)** **(1)** **(1)**

(Total 9 Marks)

Question Number	Acceptable Answers	Reject	Mark
12 (a)	Fe_2O_3		**(1)**

Question Number	Acceptable Answers	Reject	Mark
12 (b)	carbon monoxide / CO		**(1)**

Question Number	Acceptable Answers	Reject	Mark
12 (c)	coke / carbon reacts with air / oxygen **or** oxidation of coke / carbon **or** combustion of coke **or** $C + O_2 \rightarrow CO_2$		**(1)**

Question Number	Acceptable Answers	Reject	Mark
12 (d)(i)	silicon dioxide / silica / SiO_2		**(1)**

Question Number	Acceptable Answers	Reject	Mark
12(d)(ii)	***** limestone / calcium carbonate decomposes to calcium oxide ***** calcium oxide then reacts with the silicon dioxide to form slag / calcium silicate /$CaSiO_3$ ***** $CaCO_3 \rightarrow CaO + CO_2$ ***** $CaO + SiO_2 \rightarrow CaSiO_3$ **or** ***** SiO_2 reacts with limestone / calcium carbonate ***** to form slag / calcium silicate /$CaSiO_3$ ***** $CaCO_3 + SiO_2 \rightarrow CaSiO_3 + CO_2$		**(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(2)**

Question Number	Acceptable Answers	Reject	Mark
12(d)(iii)	makes iron brittle / attacks furnace lining		**(1)**

(Total 9 Marks)

Question Number	Acceptable Answers	Reject	Mark
13 (a)(i)	Some attempt to show a tetrahedral structure	If any incorrect bonding	**(1)**

Question Number	Acceptable Answers	Reject	Mark
13(a)(ii)	V-shaped	If any incorrect bonding	**(1)**

Question Number	Acceptable Answers	Reject	Mark
13 (b)	Intermolecular forces in water are stronger (or converse) / molecules are more strongly attracted (to each other) in water	If any mention of covalent bonds being broken / being stronger in water than in methane	**(1)**

Question Number	Acceptable Answers	Reject	Mark
13 (c)(i)	• Number of bonds 4, 2 • Energy required 1652, 992, 2644		**(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
13(c)(ii)	• Number of bonds 2, 4 • Energy released 1610, 1852, 3462		**(1)** **(1)**

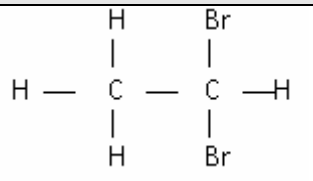
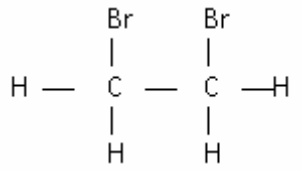
Question Number	Acceptable Answers	Reject	Mark
13(c)(iii)	2644 – 3462 = -818 (allow t.e.)	if 3462 - 2644	**(1)**

(Total 8 Marks)

Question Number	Acceptable Answers	Reject	Mark
14 (a)(i)	***** 24.24 / 12 : 4.04 / 1 : 71.72 / 35.5 ***** 2.02 : 4.04 : 2.02 or 2:4:2 ∴ 1:2:1 **or** ***** 49.5 x 24.24/100 = 12 49.5 x 4.04/100 = 2 49.5 x 71.22/100 = 35.5 ***** divide by relative atomic masses ∴ 1:2:1	any use of atomic numbers = 0/2	**(1)** **(1)** **(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
14(a)(ii)	$C_2H_4Cl_2$		**(1)**

Question Number	Acceptable Answers	Reject	Mark
14(a)(iii)	24 + 4 + 71 = 99 (Allow t.e. but only if 1:2:1 ratio in (a)(ii)		**(1)**

Question Number	Acceptable Answers	Reject	Mark
14 (b)(i)	 		**(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
14(b)(ii)	dibromoethane / 1,1-dibromoethane / 1,2-dibromoethane		**(1)**

(Total 7 Marks)

Question Number	Acceptable Answers	Reject	Mark
15 (a)(i)	electrons		**(1)**

Question Number	Acceptable Answers	Reject	Mark
15(a)(ii)	ions		**(1)**

Question Number	Acceptable Answers	Reject	Mark
15 (b)	$Cu \rightarrow Cu^{2+} + 2e^-$ or $Cu - 2e^- \rightarrow Cu^{2+}$		**(1)**

Question Number	Acceptable Answers	Reject	Mark
15 (c)(i)	9.675 – 9.040 = 0.635		**(1)**

Question Number	Acceptable Answers	Reject	Mark
15(c)(ii)	8.760 – 0.635 = 8.125 (allow t.e. from (i))		**(1)**

Question Number	Acceptable Answers	Reject	Mark
15(c)(iii)	0.635 = 0.01 mole seen or implied 96500 x 2 x 0.01 = 1930 C (allow t.e. from (i)		**(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
15(c)(iv)	1930 / 386 = 5A (allow t.e. from (iii))		**(1)** **(1)**

Question Number	Acceptable Answers	Reject	Mark
15 (d)	exactly 2 mol dm^{-3}		**(1)**

(Total 10 Marks)

PAPER TOTAL 100 MARKS