

Mark Scheme January 2008

GCE

GCE O Level Chemistry (7081/01)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Reject	Mark
3 (a)	copper(II) nitrate / copper nitrate / cupric nitrate / $\text{Cu}(\text{NO}_3)_2$		(1)
	water / H_2O		(1)

Question Number	Answer	Reject	Mark
3 (b)	sodium sulphite / sodium hydrogensulphite / Na_2SO_3 / NaHSO_3		(1)

Question Number	Answer	Reject	Mark
3 (c)	calcium / Ca		(1)

Question Number	Answer	Reject	Mark
3 (d)	ammonia + hydrogen chloride / $\text{NH}_3 + \text{HCl}$		(1)

Question Number	Answer	Reject	Mark
3 (e)	ethanol / $\text{C}_2\text{H}_5\text{OH}$ / $\text{CH}_3\text{CH}_2\text{OH}$		(1)

Question Number	Answer	Reject	Mark
4 (a)	yellow (IGNORE pale etc)		(1)

Question Number	Answer	Reject	Mark
4 (b)	brown/orange-brown/red-brown		(1)

Question Number	Answer	Reject	Mark
4 (c)	green / green-blue	blue	(1)

Question Number	Answer	Reject	Mark
4 (d)	blue (IGNORE pale, gelatinous, etc)		(1)

Question Number	Answer	Reject	Mark
4 (e)	yellow		(1)

Question Number	Answer	Reject	Mark
4 (f)	black		(1)

Question Number	Answer	Reject	Mark
5 (a)	11		(1)

Question Number	Answer	Reject	Mark
5 (b)	4		(1)

Question Number	Answer	Reject	Mark
5 (c)	3		(1)

Question Number	Answer	Reject	Mark
5 (d)	14		(1)

Question Number	Answer	Reject	Mark
5 (e)	6		(1)

Question Number	Answer	Reject	Mark
5 (f)	0.125 or $\frac{1}{8}$		(1)

Question Number	Answer	Reject	Mark
6 (a)	oxygen / O ₂	0	(1)

Question Number	Answer	Reject	Mark
6 (b)	argon / Ar		(1)

Question Number	Answer	Reject	Mark
6 (c)	carbon / silicon / C / Si (ignore any additional references to diamond or graphite)		(1)

Question Number	Answer	Reject	Mark
6 (d)	iron / Fe		(1)

Question Number	Answer	Reject	Mark
6 (e)	phosphorus / sulphur / P / P ₄ / S/S ₈ (ALLOW phosphorous, sulpher, sulfur etc)		(1)

Question Number	Answer	Reject	Mark
6 (f)	strontium / Sr		(1)

Question Number	Answer	Reject	Mark
7	solid ions molten aqueous cations electrons } these two any order		(6)

Question Number	Answer	Reject	Mark
8 (a)	gain of oxygen		(1)

Question Number	Answer	Reject	Mark
8 (b)	loss of electrons		(1)

Question Number	Answer	Reject	Mark
8 (c)(i)	K ₂ SO ₃ - gain of oxygen / increase in oxidation state of sulphur		(1)

Question Number	Answer	Reject	Mark
8 (c)(ii)	Zn - loss of electrons / increase in oxidation state		(1)

Question Number	Answer	Reject	Mark
8 (c)(iii)	<u>Sn</u> ²⁺ - loss of electrons / increase in oxidation state	Tin loses electrons	(1)

Question Number	Answer	Reject	Mark
8 (d)(i)	C + CO ₂ → 2CO		(1)

Question Number	Answer	Reject	Mark
8 (d)(ii)	Fe ₂ O ₃ + 3CO → 2Fe + 3CO ₂		(1)

Question Number	Answer	Reject	Mark
8 (d)(iii)	silicon dioxide / SiO_2 reacts with calcium carbonate / CaCO_3 to form slag / calcium silicate / CaSiO_3 or calcium carbonate decomposes to form calcium oxide / CaO calcium oxide reacts with silicon dioxide / SiO_2 to form slag		(1)
			(1)
			(1)
			(1)

Question Number	Answer	Reject	Mark
8 (d)(iv)	$\text{CaCO}_3 + \text{SiO}_2 \rightarrow \text{CaSiO}_3 + \text{CO}_2$ or $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$		(2)
			(1)
			(1)

Question Number	Answer	Reject	Mark
9 (a)	methane: line diagram shape: tetrahedral 3D effect not essential		(1) (1)

Question Number	Answer	Reject	Mark
9 (b)	ammonia: line diagram shape: pyramid 3D effect not essential; ignore any lone pair when awarding the shape mark		(1) (1)

Question Number	Answer	Reject	Mark
9 (c)	carbon dioxide: line diagram shape: linear		(1) (1)

Question Number	Answer	Reject	Mark
10 (a)(i)	C = 24.24/12 H = 4.04/1 Cl = 71.72/35.5 2.02 : 4.04 : 2.02 (allow 2:4:2) 1 : 2 : 1 accept any other correct method		(1) (1) (1)

Question Number	Answer	Reject	Mark
10(a)(ii)	$M_r(\text{CH}_2\text{Cl}) = 49.5$ and $99/49.5 = 2$, (hence $\text{C}_2\text{H}_4\text{Cl}_2$)	$M_r(\text{C}_2\text{H}_4\text{Cl}_2) = 99$ by itself	(1)

Question Number	Answer	Reject	Mark
10(a)(iii)	isomers drawn out showing bonds		(2)

Question Number	Answer	Reject	Mark
10 (b)(i)	addition		(1)

Question Number	Answer	Reject	Mark
10(b)(ii)	repeating unit correctly bonded (.....) _n		(1) (1)

Question Number	Answer	Reject	Mark
11 (a)(i)	high temperature reaction is endothermic / high temperature shifts equilibrium to the right <i>(second mark dependant on first being awarded; mark for 'high temperature' only to be given if there is some correct explanation)</i>		(1) (1)

Question Number	Answer	Reject	Mark
11(a)(ii)	increase in pressure has no effect no change in moles / volume <i>(second mark dependant on first being awarded)</i>		(1) (1)

Question Number	Answer	Reject	Mark
11(a)(iii)	increase the rate more particles in given volume / particles closer together/greater concentration of particles more frequent collisions/greater chance of collision <i>(second and third marks dependant on first being awarded)</i>		(1) (1) (1)

Question Number	Answer	Reject	Mark
11 (b)(i)	$4\text{NO} + 6\text{H}_2\text{O}$		(1)

Question Number	Answer	Reject	Mark
11(b)(ii)	900 °C		(1)

Question Number	Acceptable Answers	Reject	Mark
11(b)(iii)	platinum or platinum/rhodium (or symbols Pt or Pt/Rh)	rhodium by itself	(1)

Question Number	Answer	Reject	Mark
11(b)(iv)	Enthalpy change is negative / ΔH is negative / reaction is exothermic		(1)

Question Number	Answer	Reject	Mark
11 (c)	4, 2, 3		(1)

Question Number	Answer	Reject	Mark
12 (a)(i)	A is iron(II) sulphate / FeSO ₄ (ALLOW ferrous sulphate)		(1)
	B is iron(II) hydroxide / Fe(OH) ₂ (ALLOW ferrous hydroxide)		(1)
	C is barium sulphate / BaSO ₄		(1)

Question Number	Answer	Reject	Mark
12(a)(ii)	D is sodium sulphite / Na ₂ SO ₃		(1)
	E is sulphur dioxide / SO ₂		(1)
	F is potassium dichromate(VI) / K ₂ Cr ₂ O ₇ (VI is not essential but must be correct if given)		(1)

Question Number	Answer	Reject	Mark
12 (b)(i)	add NaOH or any identified strong alkali <i>(test reagent must be correct for further marks to be scored)</i>		(1)
	test gas with litmus (etc.) or conc HCl / HCl gas		(1)
	turns blue (or appropriate colour) or white fumes / smoke etc		(1)

Question Number	Answer	Reject	Mark
12(b)(ii)	add AgNO ₃ <i>(test reagent must be correct for further marks to be scored)</i>	AgNO ₃ + HCl (0/3)	(1)
	add HNO ₃		(1)
	cream/off-white/ <u>pale</u> yellow precipitate		(1)
	OR		
	use of Cl ₂ (g) or Cl ₂ (aq)		(1)
	solution turns brown / yellow-brown / orange		(1)
bromine formed	Red, red-brown		(1)
			MAX 3

Question Number	Answer	Reject	Mark
13 (a)(i)	$(6 \times 410) + (2 \times 610) + 350$ = 4030 kJ <i>(answer only = 2)</i>		(1) (1)

Question Number	Answer	Reject	Mark
13(a)(ii)	$2 \times 195 = 390$ kJ		(1)

Question Number	Answer	Reject	Mark
13(a)(iii)	4420 kJ <i>(allow t.e. from error in (i) - (ii))</i>		(1)

Question Number	Answer	Reject	Mark
13(a)(iv)	$(6 \times 410) + (3 \times 350) + (4 \times 275)$ = 4610 kJ <i>(answer only = 2)</i>		(1) (1)

Question Number	Answer	Reject	Mark
13(a)(v)	$\Delta H = +4420 - 4610$ = - 190 (kJ / mol) <i>(allow t.e. from error in (i)-(iv))</i>		(1) (1)

Question Number	Answer	Reject	Mark
13 (b)	brown to colourless/brown colour disappears	bromine is decolourised	(1)

TOTAL FOR PAPER: 100 MARKS

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