

# Mark Scheme (Results)

## January 2009

GCE

GCE O level Chemistry  
7081/01

• Question Number	• Acceptable Answers	• Reject	• Mark
• 1	<ul style="list-style-type: none"> <li>• Br<sup>-</sup></li> <li>• CaBr<sub>2</sub></li> <li>• aluminium sulphate</li> <li>• Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub></li> <li>• iron(II) nitrate / ferrous nitrate</li> <li>• Fe<sup>2+</sup></li> <li>• Cr<sup>3+</sup></li> <li>• Cr(OH)<sub>3</sub></li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• BR<sup>-</sup>, CA<sup>2+</sup> etc</li> </ul>	<ul style="list-style-type: none"> <li>• (1)</li> <li>• (1)</li> <li>• (1)</li> <li>• (1)</li> <li>• (1)</li> <li>• (1)</li> <li>• (1)</li> <li>• (1)</li> </ul>

(Total 8 Marks)

Question Number	Acceptable Answers	Reject	Mark
2 (a)	2,8,8,2		(1)

Question Number	Acceptable Answers	Reject	Mark
2 (b)	2,8,8		(1)

Question Number	Acceptable Answers	Reject	Mark
2 (c)	35		(1)

Question Number	Acceptable Answers	Reject	Mark
2 (d)	7		(1)

Question Number	Acceptable Answers	Reject	Mark
2 (e)	5		(1)

Question Number	Acceptable Answers	Reject	Mark
2 (f)	5		(1)

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
3 (a)	white		(1)

Question Number	Acceptable Answers	Reject	Mark
3 (b)	blue		(1)

Question Number	Acceptable Answers	Reject	Mark
3 (c)	purple or violet		(1)

Question Number	Acceptable Answers	Reject	Mark
3 (d)	black		(1)

Question Number	Acceptable Answers	Reject	Mark
3 (e)	white		(1)

Question Number	Acceptable Answers	Reject	Mark
3 (f)	dark blue or deep blue		(1)

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
4 (a)	He / Ne / Ar / Kr / Xe / Rn or full names		(1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 4 (b)	• hydrochloric / sulphuric / nitric acid or HCl / H <sub>2</sub> SO <sub>4</sub> / HNO <sub>3</sub>	• hydrogen chloride	• (1)

Question Number	Acceptable Answers	Reject	Mark
4 (c)	carbon monoxide / CO		(1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 4 (d)	• chlorine / Cl <sub>2</sub>	•	• (1)

Question Number	Acceptable Answers	Reject	Mark
4 (e)	copper(II) oxide / CuO		(1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 4 (f)	• methane / CH <sub>4</sub>	•	• (1)

(Total 6 Marks)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 5 (a)	<ul style="list-style-type: none"> <li>• moles of P = <math>22.5/31</math> (= 0.726) and moles of Cl = <math>77.5/35.5</math> (= 2.18)</li> <li>•</li> <li>• P:Cl = 1:3 hence <math>\text{PCl}_3</math></li> </ul>	•	<ul style="list-style-type: none"> <li>• (1)</li> <li>•</li> <li>•</li> <li>• (1)</li> <li>• (1)</li> </ul>

Question Number	Acceptable Answers	Reject	Mark
5 (b)	pairs of electrons in covalent bonds correctly shown		(1)
	other electrons correct (mark dependent on first being awarded)		(1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 5 (c)	<ul style="list-style-type: none"> <li>• Any two :</li> <li>• chloroethane / ethyl chloride or <math>\text{C}_2\text{H}_5\text{Cl}</math></li> <li>• hydrogen chloride or HCl</li> <li>• phosphorus oxychloride or <math>\text{POCl}_3</math></li> </ul>	•	<ul style="list-style-type: none"> <li>•</li> <li>• (1)</li> <li>•</li> <li>• (1)</li> </ul>

(Total 7 Marks)

Question Number	Acceptable Answers	Reject	Mark
6 (a)(i)	X proton Y neutron Z electron		(1) (1) (1)

Question Number	Acceptable Answers	Reject	Mark
6 (a)(ii)	proton and neutron or X and Y		(1)

Question Number	Acceptable Answers	Reject	Mark
6 (a)(iii)	atomic no. = 3 mass no. = 7		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
6 (b)(i)	3 protons + 3 neutrons / 3X and 3Y		(1)

Question Number	Acceptable Answers	Reject	Mark
6 (b)(ii)	same number of electrons (in outer shell) / same electron configuration / same electron arrangement		(1)

(Total 8 Marks)

Question Number	Acceptable Answers	Reject	Mark
7 (a)	condensation / liquefaction		(1)

Question Number	Acceptable Answers	Reject	Mark
7 (b)	in steam, particles are far apart; and move freely/randomly / long distances before collision; in water, particles are close together; and can only move short distances before collision / slide past each other;		(1) (1) (1) (1)

Question Number	Acceptable Answers	Reject	Mark
7 (c)	water to steam: particles have to be completely separated/intermolecular forces have to be completely overcome.  ice to water: particles need to be loosened / intermolecular forces partially overcome		(1)  (1)

(Total 7 Marks)



Question Number	Acceptable Answers	Reject	Mark
8 (a)(i)	explodes/violent reaction / ignites any ONE		(1)
	floats/moves on surface / fizzes / melts any ONE		(1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 8 (a)(ii)	<ul style="list-style-type: none"> <li>• <math>2\text{Rb} + 2\text{H}_2\text{O} \rightarrow 2\text{RbOH} + \text{H}_2</math></li> <li>• formulae</li> <li>• balance</li> </ul>	•	<ul style="list-style-type: none"> <li>• (1)</li> <li>• (1)</li> </ul>

• Question Number	• Acceptable Answers	• Reject	• Mark
• 8 (b)	<ul style="list-style-type: none"> <li>• <math>2\text{RbNO}_3 \rightarrow 2\text{RbNO}_2 + \text{O}_2</math></li> <li>•</li> <li>• formulae</li> <li>• balance</li> </ul>	•	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>• (1)</li> <li>• (1)</li> </ul>

(Total 6 Marks)

Question Number	Acceptable Answers	Reject	Mark
9 (a)(i)	experiment A		(1)

Question Number	Acceptable Answers	Reject	Mark
9 (a)(ii)	boiled to remove dissolved air covered in oil to exclude air		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
9 (a)(iii)	to dry the air / remove water vapour / remove moisture		(1)

Question Number	Acceptable Answers	Reject	Mark
9 (a)(iv)	both air and water are required for rusting		(1)

Question Number	Acceptable Answers	Reject	Mark
9 (b)(i)	zinc is above iron in reactivity series / more reactive corrodes/reacts in preference to iron or acts as sacrificial metal		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
9 (b)(ii)	magnesium		(1)

(Total 8 Marks)

Question Number	Acceptable Answers	Reject	Mark
10 (a)(i)	yeast		(1)

Question Number	Acceptable Answers	Reject	Mark
10(a)(ii)	25–40 °C (any value within this range)		(1)

Question Number	Acceptable Answers	Reject	Mark
10(a)(iii)	exclude air / oxygen		(1)

Question Number	Acceptable Answers	Reject	Mark
10(a)(iv)	filter/decant		(1)

Question Number	Acceptable Answers	Reject	Mark
10(a)(v)	fractional distillation		(1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 10(a)(vi)	<ul style="list-style-type: none"> <li>• <math>C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2</math></li> <li>• formulae</li> <li>• balance</li> </ul>	•	<ul style="list-style-type: none"> <li>• (1)</li> <li>• (1)</li> </ul>

Question Number	Acceptable Answers	Reject	Mark
10(b)	advantage: renewable starting material / lower temperature required disadvantage: slow / product requires purification	answers based on cost	(1) (1)

(Total 9 Marks)

Question Number	Acceptable Answers	Reject	Mark
11 (a)	structure showing the ester linkage (bonding must be shown in the –COO– section) methyl ethanoate		(1) (1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 11 (b)(i)	• –COOCH <sub>2</sub> CH <sub>2</sub> –	•	• (1)

Question Number	Acceptable Answers	Reject	Mark
11(b)(ii)	condensation nylon/ polyamide/terylene		(1) (1)

(Total 5 Marks)

Question Number	Acceptable Answers	Reject	Mark
12 (a)	3,2		(1)

Question Number	Acceptable Answers	Reject	Mark
12 (b)	5,4,6		(1)

Question Number	Acceptable Answers	Reject	Mark
12 (c)	2,2		(1)

Question Number	Acceptable Answers	Reject	Mark
12 (d)	4,2		(1)

(Total 4 Marks)

Question Number	Acceptable Answers	Reject	Mark
13 (a)	Experiment 1, increase Experiment 2, decrease		(1) (1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 13 (b)	• Experiment 1, addition of oxygen / copper reacts with oxygen / oxide layer forms • Experiment 2, loss of CO <sub>2</sub>	•	• (1) • • • (1)

Question Number	Acceptable Answers	Reject	Mark
13 (c)	Experiment 1, oxidation Experiment 2, (thermal) decomposition		(1) (1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 13(d)	• Experiment 1, $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$ • Experiment 2, $\text{CuCO}_3 \rightarrow \text{CuO} + \text{CO}_2$	•	• (1) • (1)

(Total 8 Marks)

Question Number	Acceptable Answers	Reject	Mark
14 (a)	acid: burette alkali: pipette		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
14(b)	methyl orange / phenolphthalein orange / colourless		(1) (1)

Question Number	Acceptable Answers	Reject	Mark
14(c)	to ensure accuracy / check results		(1)

Question Number	Acceptable Answers	Reject	Mark
14 (d)	28.80, 27.95, 28.05		(2)

Question Number	Acceptable Answers	Reject	Mark
14(e)	ignore 28.80 mean = 28.00		(1) (1)

• Question Number	• Acceptable Answers	• Reject	• Mark
• 14(f)	<ul style="list-style-type: none"> <li>• moles HCl = <math>0.200 \times 0.028</math> <ul style="list-style-type: none"> <li>• = 0.0056</li> </ul> </li> <li>• concentration NaOH = <math>0.0056/0.025</math> <ul style="list-style-type: none"> <li>• = 0.224 (mol dm<sup>-3</sup>)</li> </ul> </li> </ul>	•	<ul style="list-style-type: none"> <li>• (1)</li> <li>•</li> <li>• (2)</li> </ul>

(Total 12 Marks)

PAPER TOTAL 100 MARKS