

Mark Scheme (Results) Summer 2007

GCE O

GCE O Chemistry (7081/01)

At the standardisation meeting, the mark scheme will be discussed. It may be amended in the light of the discussion and of provisional marking experience. Examiners will take part in an agreement trial. The marks will be compared and discussed. Items used in the agreement trial may be taken away from the meeting for reference purposes; these must be destroyed (shredded/incinerated) at the conclusion of marking.

General Guidance on Marking

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge.

Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the Team Leader should be consulted through the review function.

Using the mark scheme

The mark scheme gives you:

- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

- 1 / means that the responses are alternatives and either answer should receive full credit.
- 2 () means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
- 3 Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is essential to the answer.

7081/01

- 1 (a) KCl (1)
(b) sulphur dioxide / sulphur(IV) oxide (1)
(c) magnesium nitrate (1)
(d) CH₃OH (1)
(e) iron(II) bromide (1)
(f) Al₂(SO₄)₃ (1)

Total 6 marks

- 2 (a) 3 (1)
2,1 (1)
(b) aluminium (1)
2.8.3 (1)
(c) chlorine (1)
17 (1)

Total 6 marks

- 3 (a) blue to pink (1)
(b) brown / pink-brown/ red-brown to black (1)
(c) green to brown/yellow/yellow brown (1)
(d) silver to (dull) grey (1)
(e) colourless to orange / orange-brown/brown (1)

Total 5 marks

- 4 (a) isotopes (1)
(b) electrons (1)
(c) titanium (1)
(d) esters (1)
(e) endothermic (1)
(f) CH₂ (1)

Total 6 marks

- 5 (a) lithium / Li (1)
 (b) iron / Fe (1)
 (c) potassium / K (1)
 (d) aluminium / Al (1)
 (e) barium / Ba (1)
 (f) copper / Cu (1)

Total 6 marks

- 6 (a) 2 (1)
 (b) 11 (1)
 (c) 3 (1)
 (d) 242 (1)
 (e) 2 (1)
 (f) 1200 (1)

Total 6 marks

- 7 (a) add acid (dilute or conc. HCl or dilute HNO₃ or dilute H₂SO₄ but not conc. H₂SO₄ or conc. HNO₃) (1)
 potassium dichromate/K₂Cr₂O₇ (1)
 turns from orange to green (1)
 or potassium manganate(VII) (accept 'permanganate' or KMnO₄)
 turns (from pink or purple to) colourless/ decolourises
 (b) add concentrated sulphuric acid/H₂SO₄ (1)
 add ammonia (1)
 white smoke/ fumes (1)
 or
 add silver nitrate on a rod (etc)
 white ppt/colour (in drop)

Total 6 marks

- 8 (a) addition / reduction (1)
- (b) neutralisation (1)
- (c) reduction (1)
- (d) combustion (1)
- (e) displacement (1)
- (f) polymerisation (accept addition polymerisation) (1)

Total 6 marks

- 9 (a) add silver nitrate/ AgNO_3 (1)
 chloride gives a white precipitate/solid (1)
 bromide gives an off-white / cream precipitate/pale yellow ppt (1)
 or
 add chlorine (gas or aqueous)
 NaCl - no change
 NaBr - turns yellow/orange/brown
- (b) bromine water/ Br_2 (aq) (1)
 ethane no reaction / stays brown (1)
 ethene decolorises (1)
 or
 add acidified KMnO_4 (or alkaline)/potassium manganate
 (VII)/potassium permanganate
 ethane: no change
 ethene: decolourised (or turns green)
- (c) add BaCl_2 (or $\text{Ba}(\text{NO}_3)_2$) + HCl (or HNO_3) (1)
 white ppt (1)
 no ppt/ppt dissolves (1)
 or
 add acidified $\text{KMnO}_4/\text{K}_2\text{Cr}_2\text{O}_7$
 no change
 KMnO_4 decolourised / $\text{K}_2\text{Cr}_2\text{O}_7$ turns green
 Or
 add (dilute) acid
 sulphate no reaction
 sulphite releases pungent gas/bubbles/ SO_2 + appropriate test for it

Total 9 marks

- 10 (a) (i) HCl/H₂SO₄ (but not conc. H₂SO₄) (1)
(ii) Mg/Zn/Fe (1)
(Accept calcium or lithium + water)
(iii) calcium oxide / anhydrous calcium chloride / silica gel (1)
- (b) drying agent / to dry the gas (or H₂) (1)
- (c) burns with 'pop' (Not glowing splint gives a pop) (1)
- (d) 2H₂ + O₂ → 2H₂O (accept multiples or halved) (1)

Total 6 marks

- 11 (a) (i) (15.13 - 14.84 =) 0.29 g (1)
(ii) (15.19 - 14.84 =) 0.35 g (1)
(iii) (0.35 - 0.29 =) 0.06 g (1)
(Unit not essential but must be correct if given)
- (b) $\frac{0.29}{23}$: $\frac{0.06}{14}$ (Division by 23 and 14 required to score further marks) (1)
0.0126 : 0.00429 (1)
Na₃N (1)

(answer with no working = 1 mark)

- (c) 6Na + N₂ → 2Na₃N (1)
symbols and formulae (1)
balance (1)
(Incorrect formula for sodium nitride in correctly balanced equation = 1 mark)

Total 8 marks

- 12 (a) Any two from alkene / ketone / carboxylic or alkanoic acid (2)
- (b) unsaturated because it contains double bonds/C=C (1)
- (c) no because it contains oxygen /does not contain only carbon and hydrogen (1)
- (d) acidic (1)
acid group (dissociates) to give H⁺ / equation -COOH → COO⁻ + H⁺ (1)

Total 6 marks

- 13 (a) Pb^{2+} , Br^- (or 2Br^-) (1)
- (b) (i) $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$ or $2\text{Br}^- - 2\text{e}^- \rightarrow \text{Br}_2$ (1)
(ii) $\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}$ (1)
ALLOW 1 mark if both equations are correct but at the wrong electrode
- (c) charge carried (through lead bromide) by ions /lamp lights when ions move (1)
not mobile in solid lead bromide (1)
- (d) 2F would deposit 207 g of lead (i.e. 2:1 ratio) (1)
0.1 F will deposit $207 \times 0.5 \times 0.1 = 10.35$ g (1)
(Allow t.e. if incorrect ratio)

Total 7 marks

- 14 (a) $2\text{Cu}(\text{NO}_3)_2 \rightarrow 2 \text{CuO} + 4\text{NO}_2 + 1 \text{O}_2$ (1)
- (b) brown/orange-brown/red-brown gas or fumes (1)
- (c) moles of copper(II) nitrate = $1.875 / 187.5 = 0.01$ (1)
moles of nitrogen dioxide = 0.02 (1)
volume of nitrogen dioxide $0.02 \times 24000 = 480 \text{ cm}^3$ (or 0.48 dm^3) (1)
- (d) (i) Li/any Gp2 metal/transition metal nitrate (not AgNO_3) (1)
(allow Pb and Zn) (1)
(ii) Na/K nitrate (names or formulae) (1)
(name of metal without "nitrate" is acceptable)

Total 7 marks

- 15 (a) (i) parsley (1)
(ii) celery (1)
- (b) (i) calcium hydroxide (1)
(ii) addition of water (1)
ACCEPT equation $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$
- (iii) $\text{Ca}(\text{OH})_2 + 2\text{H}^+ \rightarrow \text{Ca}^{2+} + 2\text{H}_2\text{O}$ (1)
OR $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- (c) 5.5 (1)
- (d) $150 \times 100 \times 405 \times 2$ (1)
 $= 12\,150\,000 \text{ g} = 12\,150 \text{ kg}$ (1)
- (e) limestone is a base / neutralises any acid (1)
 $\text{CaCO}_3 + 2\text{H}^+ \rightarrow \text{Ca}^{2+} + \text{H}_2\text{O} + \text{CO}_2$ (1)

Total 10 marks

PAPER TOTAL 100