

# Mark Scheme (Results)

## January 2007

GCE

GCE O Level Chemistry (7081/01)



- |    |                              |                  |                    |     |
|----|------------------------------|------------------|--------------------|-----|
| 1. | $\text{Pb}(\text{NO}_3)_2$   |                  | $\text{NO}_3^-$    | (2) |
|    | $\text{Al}_2(\text{SO}_4)_3$ |                  |                    | (1) |
|    |                              | $\text{Mn}^{3+}$ |                    | (1) |
|    |                              | $\text{Ca}^{2+}$ | $\text{PO}_4^{3-}$ | (2) |

Total 6 marks

Do not allow  $\text{PB}^{2+}$ ,  $\text{MN}^{3+}$  etc

2. (a) nitrogen (1)
- (b) iodine (not 'iodide') (1)
- (c) graphite (1)
- (d) sulphur (allow sulfur, sulpher, sulfer) (1)
- (e) copper(II) nitrate (allow without bracket around II, allow 'cupric nitrate') (1)
- (f) hydrogen (1)

Total 6 marks

3. (a) presence of water / moisture and air / oxygen (1)
- (b) any two of painting, oiling, plastic coating, chrome plating (etc), galvanising, alloying (2)  
(1 mark for each correct answer up to max 2; if 3 answers given and two are correct but one is wrong, then an incorrect one cancels a correct one and so 1 mark only.)
- (c) Slower / decreased (1)  
magnesium is above iron in the reactivity series / is more reactive than iron (1)  
magnesium reacts / oxidises/ (not 'rusts') (in preference to iron) / is a sacrificial metal (1)

Total 6 marks

4. 35 30 (2)  
19 18 (2)  
 $^{32}_{16}\text{S}$  1 mark for each correct number in the correct place. (2)

Total 6 marks

5. **Accept names or correct formulae**
- (a) copper or Cu and carbon dioxide / monoxide or CO<sub>2</sub>/CO (1)
- (b) hydrogen or H<sub>2</sub> and oxygen or O<sub>2</sub> (1)
- (c) hydrochloric / sulphuric acid or HCl/H<sub>2</sub>SO<sub>4</sub> and iron/zinc/magnesium or Fe/Zn/Mg (1)  
(allow HCl + Al)
- (d) sodium sulphite or Na<sub>2</sub>SO<sub>3</sub> and water or H<sub>2</sub>O (1)
- (e) phosphorus(V) chloride / phosphorus pentachloride / PCl<sub>5</sub> (1)  
(allow 'phosphorous .....')

**Total 5 marks**

6. NaOH / KOH / Ca(OH)<sub>2</sub> or names (1)
- NH<sub>3</sub> turns red litmus blue OR + HCl gas/conc HCl / hydrogen chloride gives white fumes (1)
- sodium sulphite / Na<sub>2</sub>SO<sub>3</sub> (1)
- turns orange 'dichromate' green / turns purple potassium permanganate colourless (1)
- Manganese dioxide / manganese(IV) oxide / potassium manganate(VII) / potassium permanganate (1)
- bleaches litmus paper (or similar) ignore ref. to turning blue litmus paper red (1)
- (names or formulae throughout)

**Total 6 marks**

7. (a) 1000 cm<sup>3</sup> / 1 dm<sup>3</sup> / 1 litre (1)
- (b) 600 cm<sup>3</sup> / 0.6 dm<sup>3</sup> / 0.6 litre (1)
- (c) 24 dm<sup>3</sup> → 2220 kJ OR moles = 200/24000 (1)  
∴ 0.2 dm<sup>3</sup> → 2220/24 x 0.2 kJ OR heat evolved = 2200 x moles (1)  
∴ 18.5 kJ (1)
- (Correct answer with some working scores 3)  
(Correct answer with no working scores 2)

**Total 5 marks**

8. (a) 2C + O<sub>2</sub> → 2CO symbols (1) balance (1) (2)
- (b) 2NaOH + CO<sub>2</sub> → Na<sub>2</sub>CO<sub>3</sub> + H<sub>2</sub>O symbols (1) balance (1) (2)
- (c) 3CuO + 2NH<sub>3</sub> → 3Cu + N<sub>2</sub> + 3H<sub>2</sub>O symbols (1) balance (1) (2)  
(allow multiples)

**Total 6 marks**

9. (a) points plotted correctly (1) straight line through points (1) (2)
- (b) 37 g (1)
- (c) 42.5 - 43 g dissolves (1)  
2.5 - 2 g (1)
- (d) 75 - 76 °C (1)
- (e) 45.8 - 34.2 g (1)  
11.6 g crystallises out (1)

In (c) and (d), correct answer scores 2.

**Total 8 marks**

10. (a) 6 (1)
- (b) 7 (1)
- (c) 3 (1)
- (d) 22 (1)
- (e) 16 (1)
- (f) 2 (1)
- (g) 48 (1)

**Total 7 marks**

11. (a) (i) a compound that contains carbon and hydrogen **only** (1)  
(ii) saturated: contains single bonds **only** (1)  
unsaturated: contains a double bond (1)
- (b) (i) displayed formula for propane (1)  
displayed formula for propene (1)  
(ii) circle drawn around an appropriate carbon atom (1)  
(iii) arrow to correct carbon atom (1)
- (c) (i) structural / displayed formula for 1,2-dichloroethane (1)  
(ii) structural / displayed formula for chloroethane (1)

**Total 9 marks**

12. (a) Oxide (1)  
carbon monoxide or CO (1)
- (b) higher/above etc (1)  
Aluminium / Al (1)  
2Al and Al<sub>2</sub>O<sub>3</sub> (1)
- (c) Electrolysis (1)  
Cryolite (1)  
gain / accept (1)  
Negative (1)  
carbon/graphite / C (1)  
Oxygen / O<sub>2</sub> (1)  
carbon dioxide / carbon monoxide / CO<sub>2</sub> / CO (1)

Total 12 marks

13. (a) A is silver nitrate / AgNO<sub>3</sub> (1)  
B is calcium iodide / CaI<sub>2</sub> (*B is consequential on halide in C*) (1)  
C is silver iodide / AgI (1)
- (b) D is platinum / Pt (or platinum-rhodium or Pt-Rh) (1)  
E is nitrogen oxide / nitrogen monoxide / NO / nitric oxide / nitrogen (II) oxide (1)  
F is nitrogen dioxide / NO<sub>2</sub> / Nitrogen (IV) oxide (1)  
G is nitric acid / HNO<sub>3</sub> nitric (V) acid (1)

Total 7 marks

14. (a) to speed up the reaction / increase rate of reaction / to make reaction fast (1)
- (b) to ensure all of metal reacted (1)
- (c) to prevent oxidation / prevent formation of oxide (1)
- (d) (i) moles of copper =  $1.27/63.5 = 0.02$  (1)  
 $= 0.02 = \text{moles of M}$  (1)  
(ii)  $A_r = 2.38/0.02 = 119$  (1)  
(iii) M is tin (allow t.e.) (1)
- (e) metal is brown OR red/brown OR pink (1)  
Cu<sup>2+</sup> ions removed (1)
- (f) Cu<sup>2+</sup> gains electrons /  $\text{Cu}^{2+} + 2e \rightarrow \text{Cu}$  ∴ reduction (1)  
M loses electrons /  $\text{M} \rightarrow \text{M}^{2+} + 2e$  ∴ oxidation (1)

Total 11 marks

PAPER TOTAL 100 MARKS