

## MARK SCHEME for the October/November 2006 question paper

### 5070 CHEMISTRY

5070/04

Paper 4 (Alternative to Practical), maximum raw mark 60

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

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- 1 Pipette (1) [1]
- 2 (a) (i) blue (1)  
(ii) red (1)  
(iii) hydrochloric acid (1)
- (b) (i) C (1) Ammonia travels faster than Hydrogen Chloride (1)  
rate is inversely proportional to molar mass or density (1)  
or Ammonia is lighter than hydrogen chloride so travels faster (not further). (2)  
*NOT aqueous NH<sub>3</sub> is lighter etc.*  
*NOT ammonia is smaller etc.*  
*Incorrect position e.g. A, but chemistry correct loses 1<sup>st</sup> mark*  
*Incorrect position with consequential correct reasoning but incorrect chemistry loses all three.*  
(ii) Diffusion (1)  
(iii) NH<sub>4</sub>Cl, ammonium chloride (1)
- (c) Y (NH<sub>3</sub>), X (HCl) (both) (1) both are soluble (1)  
HCl more dense, NH<sub>3</sub> less dense than air (1) (must compare with air).  
*Y and X reversed but correct chemistry loses 1<sup>st</sup> mark but incorrect chemistry loses all marks.*  
*X, Y and Z incorrect but two correct statements for one of the gases. e.g. HCl denser than air and soluble in water – 1 mark.*  
*NH<sub>3</sub> and HCl given no letters but chemistry correct loses 1<sup>st</sup> mark.* [11]
- 3 (a) water flowing in wrong direction or water coming from wrong side etc. (1)
- (b) condenser (1) to return reactants to reaction flask, or prevent reactants escaping, or condense vapours back to liquids. (1) (not just to condense or cool)
- (c) (i) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH showing all bonds (1) (*1 H missing on structure but bond shown accept, but not on OH group and no more than 1 H*).  
(ii) acidified potassium dichromate(VI) (1) or acidified potassium manganate(VII) (1)  
(accept potassium dichromate or potassium permanganate)  
accept H<sup>+</sup>/Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup> or acidified dichromate etc.  
(iii) orange (1) to green (1) or purple (1) to colourless (1)
- (d) propan-2-ol (allow prop-2-ol, 2-propanol (1), and propane-2-ol)  
CH<sub>3</sub>CH(OH)CH<sub>3</sub> showing all bonds (1) [9]
- 4 to 8 (a), (c), (a), (a), (d) 1 mark each [5]
- 9 Test 1 transition metal present (1)  
Test 2 (a) and (b) Fe<sup>2+</sup>, Fe<sup>+2</sup> or Fe(II) ion present (1) both.  
(c) warm the solution from (b) or warm with aq. NaOH (1)  
gas or ammonia evolved (1) test for ammonia (1).  
(*addition of aluminium loses first mark only, so long as warm and aq. NaOH are mentioned*)  
Test 3 aq. Ba (NO<sub>3</sub>)<sub>2</sub>/HNO<sub>3</sub> or aq. BaCl<sub>2</sub>/HCl (2) white ppt. (1)  
*No acid or just acidified loses acid mark.*  
*Incorrect test loses all marks*  
*Use of BaSO<sub>4</sub> or H<sub>2</sub>SO<sub>4</sub> with white ppt. – 1/3 only.*  
*Use of Pb(NO<sub>3</sub>)<sub>2</sub> with white ppt. – 2/3 marks*  
*If formulae used it must be correct.* [8]

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- (a) 4.73 g (1)  
 (b) yellow to orange, red, pink (1)  
 (c)
- |                                       |      |      |  |
|---------------------------------------|------|------|--|
| 25.2                                  | 38.3 | 28.2 | 1 mark for each row<br>or column or (3) (mark<br>either rows or columns) |
| 0.0                                   | 13.6 | 3.7  |  |
| 25.2                                  | 24.7 | 24.5 |  |
| Mean value = 24.5 cm <sup>3</sup> (1) |      |      |  |
- (d) 0.00246 (1) (e) 0.00246 (1)  
 (f) 0.0246 (1) (g) 0.05 (1)  
 (h) 0.0254 (1) (i) 0.432 (1)  
 (j)  $0.432 \times 1000/4.73 = 91.3 \text{ g}$  (1)  
*A.E > 1% loses 1 mark, max. 2.*  
**(h)** if answer is negative it must be shown. [13]
- 10 (a) Relights a glowing splint (1)  
 (b) 32, 52, 64, 70 all correct (2) one error (1)  
 (c) points plotted (as shown in table) correct (1)  
 two curved lines (1) points connected by a series of lines (0)  
 passing through zero (1)
- (d) (i) 32 cm<sup>3</sup> (1)  
 (ii)  $59 - 47 (1) = 12 \text{ cm}^3 (1)$   
*If answer only check graph. If correct 2 marks.*  
*If answer only but no evidence on graph 0 marks.*  
*If wrong answer check graph. If points are as stated but at incorrect time value and subtraction is correct 1 only.*  
All plots and answers to (d) must be to nearest  $\frac{1}{2}$  small square.  
 Answers to (d)(i) and (ii) as per candidates graph.
- (e) speeds up reaction/catalyst (1)
- (f) (i) reaction complete, finished or at the end-point or similar (1)  
*Not stopped*  
 Any reference to CuO being used up loses the mark.  
 (ii) Molar mass of  $\text{KClO}_3 = 122.5$  or  $2 \times \text{KClO}_3 = 245 (1)$   
 $2 \times 122.5 \text{ g}$  gives  $3 \times 24 \text{ dm}^3 = 72 \text{ 000 cm}^3$  oxygen  
 $72 \text{ cm}^3$  is produced from  $0.245 \text{ g}$  (1)  
 correct answer gets both marks. [13]