

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

**MARK SCHEME for the November 2004 question paper**

**0620 CHEMISTRY**

**0620/03**

**Paper 3 (Extended Theory), maximum mark 150**

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 initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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*.

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

CIE is publishing the mark schemes for the November 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.



**Grade thresholds** taken for Syllabus 0620 (Chemistry) in the November 2004 examination.

|             | maximum mark available | minimum mark required for grade: |    |    |    |
|-------------|------------------------|----------------------------------|----|----|----|
|             |                        | A                                | C  | E  | F  |
| Component 3 | 150                    | 52                               | 34 | 25 | 19 |

The threshold (minimum mark) for B is set halfway between those for Grades A and C. The threshold (minimum mark) for D is set halfway between those for Grades C and E. The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.

Grade A\* does not exist at the level of an individual component.



November 2004

**INTERNATIONAL GCSE**

**MARK SCHEME**

**MAXIMUM MARK: 150**

**SYLLABUS/COMPONENT: 0620/03**

**CHEMISTRY**  
**Extended Theory**



| Page 1 | Mark Scheme           | Syllabus | Paper |
|--------|-----------------------|----------|-------|
|        | IGCSE – November 2004 | 0620     | 3     |

- 1 (a) carbon dioxide, water vapour, noble gases **or** a named noble gas  
Any **TWO** [2]
- (b) burning fossil fuels [1]  
**COND** that contain sulphur [1]  
acid rain **or** any effect of acid rain - deforestation, effect on stone work,  
corrosion of metals, acidity in lakes, health etc [1]
- motor vehicles **or** petrol **or** car exhausts [1]  
health, if specified then brain, nervous system, development of children etc [1]  
do not select from list illnesses
- OR** lead in old paint [1]  
harmful effect as above [1]
- (c) (i) combustion **or** burning **NOT** dissolving in the ocean [1]
- (ii)  $6\text{CO}_2 + 6\text{H}_2\text{O}$  [1]  
exothermic [1]
- (d) (i) glowing splint burst into flame or rekindled [1]  
Must have glowing or equivalent idea  
**OR** any similar description that includes the two points glowing and relights.
- (ii) measure volume **or** count bubbles [1]  
time [1]  
**NOT** units
- (iii) rate slows down [1]  
Because the reaction is photochemical **or** rate depends on intensity of light  
**or** light less bright or less light falling on plant **or** light provides energy for  
photosynthesis etc. [1]
- TOTAL = 15**
- 2 dilute  
filter  
saturated  
cool  
blue  
sulphate [6]
- TOTAL = 6**
- 3 (a) (i) no change in concentration of reagents **or** rates equal [1]  
Accept no change in amounts or it is as if the reaction has Stopped
- (ii) back reaction is endothermic **or** the forward reaction is exothermic [1]  
Increase in temperature favours the endothermic reaction which is the back  
reaction or vice versa. [1]  
NB look for correct conclusion re thermicity and comment re position of  
equilibrium.

| Page 2 | Mark Scheme           | Syllabus | Paper |
|--------|-----------------------|----------|-------|
|        | IGCSE – November 2004 | 0620     | 3     |

|   |         |  |                   |
|---|---------|--|-------------------|
|   | (iii)   | increased rate   | [1]               |
|   |         | because molecules collide more frequently <b>or</b> concentration of molecules is increased <b>or</b> molecules are closer | [1]               |
|   |         | <b>NOT</b> they have more KE   |                   |
|   |         | increased yield  | [1]               |
|   |         | high pressure favours side with few molecules <b>or</b> smaller volume <b>or</b> moves to reduce the pressure              | [1]               |
|   |         | this is product side this can be implied   | [1]               |
|   | (b) (i) | CO <sub>2</sub> and H <sub>2</sub> O   | [1]               |
|   |         | balanced   | [1]               |
|   |         | 2CH <sub>3</sub> OH + 3O <sub>2</sub> = 2CO <sub>2</sub> + 4H <sub>2</sub> O   |                   |
|   | (ii)    | methyl ethanoate   | [1]               |
|   |         | water  | [1]               |
|   | (iii)   | Methanoic (acid) accept formic acid  | [1]               |
|   |         |  | <b>TOTAL = 13</b> |
| 4 | (a) (i) | Correct equation with a more reactive metal  | [1]               |
|   | (ii)    | Electron loss  | [1]               |
|   | (iii)   | Because they can accept electrons or take electrons away from.....   | [1]               |
|   | (iv)    | Silver or silver(I)  | [1]               |
|   | (b) (i) | increase   | [1]               |
|   | (ii)    | zinc   |                   |
|   |         | <b>COND</b> and a correct reason - such as it loses electrons more easily <b>or</b> it is more reactive                    | [1]               |
|   |         | Need both zinc and reason for the mark.  |                   |
|   | (iii)   | from the more reactive to the less reactive <b>NOT</b> just from zinc to lead  | [1]               |
|   |         |  | <b>TOTAL = 7</b>  |
| 5 | (a)     | Group II metals will lose 2e   | [1]               |
|   |         | Group VI elements will gain 2e   | [1]               |
|   | (b)     | SCl <sub>2</sub>   | [1]               |
|   |         | <b>COND</b> 8e around both chlorine atoms  | [1]               |
|   |         | 8e around sulphur with 2np and 2bp   | [1]               |
|   |         | If x and o reversed ignore if this is the only error   |                   |
|   | (c) (i) | Ions cannot move in solid <b>or</b> can move in liquid   | [1]               |
|   | (ii)    | No ions in sulphur chloride <b>or</b> it is covalent <b>or</b> only molecules <b>or</b> only strontium chloride has ions   | [1]               |
|   |         |  | <b>TOTAL = 7</b>  |

| Page 3 | Mark Scheme           | Syllabus | Paper |
|--------|-----------------------|----------|-------|
|        | IGCSE – November 2004 | 0620     | 3     |

- 6 (a) (i) correct structure [1]  
 $\text{CH}_2=\text{CCl}_2$
- (ii) because it has a lower  $M_r$  **or** density **or** its molecules move faster [2]  
it is lighter **ONLY** [1]  
only comment - smaller molecules [0]  
answer implies or states sieve idea then [0]
- (b) (i) ester linkage [1]  
COND polymer chain showing different monomers and continuation [1]  
 $-\text{OOC}-\text{C}_6\text{H}_4-\text{COOCH}_2\text{CH}_2\text{O}-$
- (ii) fats **or** lipids [1]
- (iii) does not decompose easily when heated [1]  
accept similar statements
- (c) (i) does not decompose **or** non-biodegradable shortage of landfill sites **or** of space visual pollution  
poisonous/toxic/harmful gases when burnt  
**NOT** carbon monoxide, sulphur dioxide. If gas named has to be a correct one eg  $\text{HCl}$ ,  $\text{HCN}$   
dangerous to animals  
Any **TWO** [2]
- (ii) conserve petroleum or save energy [1]  
**NOT** cheaper
- TOTAL = 10**
- 7 (a) (i)  $\text{Zn}(\text{OH})_2 = \text{ZnO} + \text{H}_2\text{O}$  [2]  
reactant [1] products [1]
- (ii) it would melt **or** it does not decompose **or** it does not react [1]  
**NOT** no change
- (iii) blue (solid) [1]  
to black (solid) [1]  
brown gas [1]

Mark consequentially to any error **but not involving simple integers**

There has to be some evidence that the candidate has attempted to work through the calculation and not merely inserted whole numbers.

For example 2, 1, 160 or 1, 0.5, 80

number of moles of  $\text{Fe}_2(\text{SO}_4)_3$  =  $1/40$  **or** 0.025

number of moles of  $\text{Fe}_2\text{O}_3$  formed =  $1/40$  **or** 0.025

mass of iron(III) oxide formed =  $0.025 \times 160 = 4\text{g}$

number of moles of  $\text{SO}_3$  produced =  $3/40$  **or** 0.075

volume of sulphur trioxide at r.t.p. =  $0.075 \times 25$

=  $1.8\text{dm}^3$

**[5]**

**TOTAL = 11**

| Page 4 | Mark Scheme           | Syllabus | Paper |
|--------|-----------------------|----------|-------|
|        | IGCSE – November 2004 | 0620     | 3     |

- 8 (a) (i)  $C_6H_{12}$  [1]  
between 60 to 65°C [1]
- (ii)  $C_{12}H_{24}$  [1]  
**COND** giving some indication of the method [1]
- (b) add bromine water **or** potassium manganate(VII) [1]  
butene it goes from brown/orange/yellow to colourless  
**or** manganate (VII) from pink to colourless [1]  
**NOT** clear  
Cyclobutane it remains brown/orange/yellow **or** manganate (VII) stays pink  
**or** no colour change [1]  
Accept does not react  
Provided colour of reagent somewhere in the answer [3] is possible
- (c) (i) alcohol [1]
- (ii)  $CH_3-CH_2-CHCl-CH_3$  [1]
- (iii)  $-CH(CH_3)-CH(CH_3)-$  [2]  
or any equivalent diagram  
[1] for repeat unit and [1] for continuation

**TOTAL = 11**