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*.

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UNIVERSITY *of* CAMBRIDGE
International Examinations

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

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) $6CO_2 + 6H_2O$ [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) <u>rate</u> 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.

(iii) increased rate **[1]**
because molecules collide more frequently **or** concentration of molecules is
increased **or** molecules are closer **[1]**
NOT they have more KE
increased yield **[1]**
high pressure favours side with few molecules **or** smaller volume **or** moves
to reduce the pressure **[1]**
this is product side this can be implied **[1]**

(b) (i) CO_2 and H_2O **[1]**
balanced **[1]**
$2CH_3OH + 3O_2 = 2CO_2 + 4H_2O$

(ii) methyl ethanoate **[1]**
water **[1]**

(iii) Methanoic (acid) accept formic acid **[1]**

TOTAL = 13

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
COND and a correct reason - such as it loses electrons more easily **or**
it is more reactive **[1]**
Need both zinc and reason for the mark.

(iii) from the more reactive to the less reactive **NOT** just from zinc to lead **[1]**

TOTAL = 7

5 (a) Group II metals will lose 2e **[1]**
Group VI elements will gain 2e **[1]**

(b) SCl_2 **[1]**
COND 8e around both chlorine atoms **[1]**
8e around sulphur with 2nbp and 2bp **[1]**
If x and o reversed ignore if this is the only error

(c) (i) Ions cannot move in solid **or** can move in liquid **[1]**

(ii) No ions in sulphur chloride **or** it is covalent **or** only molecules **or** only
strontium chloride has ions **[1]**

TOTAL = 7

6 (a) (i) correct structure [1]
$CH_2=CCl_2$

    (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]
$-OOC-C_6H_4-COOCH_2CH_2O-$

    (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 <u>burnt</u>
NOT carbon monoxide, sulphur dioxide. If gas named has
to be a correct one eg HCl, HCN
dangerous to animals
Any **TWO** [2]

    (ii) conserve petroleum or save energy [1]
NOT cheaper

                                             TOTAL = 10

7 (a) (i) $Zn(OH)_2 = ZnO + H_2O$ [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 <u>gas</u> [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 $Fe_2(SO_4)_3$ = 1/40 **or** 0.025
number of moles of Fe_2O_3 formed = 1/40 **or** 0.025
mass of iron(III) oxide formed = 0.025 x 160 = 4g
number of moles of SO_3 produced = 3/40 **or** 0.075
volume of sulphur trioxide at r.t.p. = 0.075 x 25
= 1.8dm^3 [5]

                                             TOTAL = 11

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]**
<u>butene</u> 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