UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2006 question paper

0620 CHEMISTRY

0620/03 Paper 3 (Extended Theory), maximum raw mark 80

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.

CIE is publishing the mark schemes for the October/November 2006 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

1 **(i)** noble gas — argon
(ii) acidic oxide — carbon dioxide
(iii) can be polymerised — ethene
(iv) active component — oxygen
(v) treatment of water — chlorine
(vi) product of respiration — carbon dioxide

[TOTAL = 6]

2 More than required number of answers – [0]
(i) **A**, **B**, **D** [1]
(ii) **D** [1]
(iii) **F** [1]
(iv) **C** and **E** [1]
(v) **A** [1]
(vi) **E** [1]

[TOTAL = 6]

3 **(a)** limestone **or** marble **or** chalk or coral or calcite or aragonite [1]

(b) **(i)** 100 [1]
56 ignore units in both cases [1]

(ii) 7.00kg is 1/8 of 56 [1]
1/8 of 100kg is 12.5kg [1]
Give both marks for correct answer without explanation. Ignore missing units but penalise wrong units

(c) **(i)** Any reasonable explanation
Plants prefer soil pH about 7
Plants do not grow (well) in acidic soils/plants grow better
To increase crop yields
Any **ONE** [1]
Do **NOT** accept in acidic soils plants die

(ii) With calcium carbonate, pH cannot go above 7 [1]
It is not washed away by the rain/remains longer in the soil
It is not absorbed by the plant [1]
OR
With calcium oxide, pH can go above 7 [1]
It is washed away by the rain [1]

(iii) Any correct use - making steel/iron, making cement, making glass, disposing of acid wastes, removing sulphur dioxide from flue gases, (stone in) building, indigestion tablets, toothpaste, cosmetics etc [1]

[TOTAL = 9]

4 **(a)** **(i)** $CH_4 + 2O_2 = CO_2 + 2H_2O$ [2]
Not balanced [1] **ONLY**

(ii) carbon monoxide is formed [1]
COND it is poisonous [1]
NOT incomplete combustion

(b) Burns to form sulphur dioxide [1]
Comment about acid rain/lung disease e.g. bronchitis [1]

(c) **(i)** Transition elements/metals **or** d block elements [1]

(ii) carbon monoxide is changed into carbon dioxide
hydrocarbons to carbon dioxide and water (by reacting with the oxygen)

[TOTAL =]

5 **(a)** **(i)** iron [1]

(ii) advantage higher yield [1]
explanation lower temperature favours the exothermic reaction
(that is the forward reaction) [1]

(b) **(i)** Sent over the catalyst again **or** used to make more ammonia [1]
NOT just reused

(ii) It has the highest boiling point [1]

(c) **(i)** $CO_2 + 2NH_3 = CO(NH_2)_2 + H_2O$ [2]
Not balanced [1]

(ii) Any comment based on deficiency of PK/or ONLY provides Nitrogen as a nutrient [1]
NOT soil pH

(d) Correct diagram for urea [3]
one error ONLY [2]
two errors ONLY [1]
three errors 0

[TOTAL = 11]

6 **(a)**

	copper	iron	sulphur
composition by mass/g	(4.80)	(4.20)	4.8 [1]
number of moles of atoms	0.075	0.075	0.15 [1]
simplest mole ratio of atoms	1	1	2 [1]

[3]

The empirical formula is $CuFeS_2$ [1]

(b) **(i)** impure copper/blister copper/boulder copper etc [1]
(pure) copper [1]
copper sulphate **or** nitrate **or** chloride **or** contains $Cu^{2+}aq$ [1]

(ii) $Cu^{2+} + 2e^- = Cu$ [1]

(iii) Zinc [1]

(c) Copper has delocalised electrons [1]
In sulphur the electrons are localised **or** cannot move in the piece of sulphur [1]

In copper there are layers of copper atoms/ions
Which can slip [1]
In sulphur there are no layers [1]

[TOTAL = 13]

7 **(a)** **(i)** greater initial slope or levels off later [1]
Twice final volume

(ii) smaller slope
same final volume

(b) more particles in same volume/particles closer together [1]
greater collision rate [1]

molecules move faster [1]
greater collision rate [1]

OR molecules have more energy [1]
so more will have sufficient energy to react [1]

(c) **(i)** glucose [1]
oxygen [1]

(ii) chlorophyll [1]

[TOTAL = 11]

8 **(a)** **(i)** biological catalyst [1]

(ii) linkage ----O----
same unit as in glucose as on question paper that is rectangles [1]

(iii) chromatography [1]

(b) **(i)** --NHCO—linkage
different units
-NH and -CO on same monomer unit
All three [2] two points [1] [2]

(ii) amino acids [1]

(c) **(i)** propanol + ethanoic acid = propyl ethanoate + water [2]
reactants [1] products [1]

(ii) ester linkage correct [1]
rest of molecule correct [1]

(iii) bromine water [1]
fat 1 orange **or** yellow **or** brown to colourless [1]
fat 2 remains orange **or** yellow **or** brown [1]
Accept Potassium Manganate(VII) with corresponding colour changes

(iv) soap or sodium salts (of carboxylic acids)/sodium stearate [1]
alcohol/glycerol [1]

[TOTAL = 15]

[6+6+9+9+11+13+11+15 = 80]