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

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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.

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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.

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International Examinations

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 [1]
hydrocarbons to carbon dioxide and water (by reacting with the oxygen) [1]

[TOTAL = 9]

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 [1]

(ii) smaller slope [1]
same final volume [1]

(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]