

June 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0620/03

**CHEMISTRY
Extended**



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	Chemistry – June 2004	0620	3

- When the name of a chemical is demanded by the question, a **correct** formula is usually acceptable. When the formula is asked for, the name is not acceptable.
- When a word equation is required a **correct** symbol equation is usually acceptable. If an equation is requested then a word equation is not usually acceptable.
- An incorrectly written symbol, e.g. NA **or** CL, should be penalised once in a question.

In the mark scheme if a word **or** phrase is underlined it (**or** an equivalent) is required for the award of the mark.

(.....) is used to denote material that is not specifically required.

OR designates alternative and independent ways of gaining the marks for the question.

or indicates different ways of gaining the same mark.

COND indicates that the award of this mark is conditional upon a previous mark being gained.

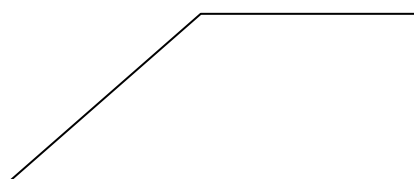
- Unusual responses which include correct Chemistry that answers the question should always be rewarded - even if they are not mentioned in the mark scheme.
- All the candidate's work must show evidence of being marked by the examiner.

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- | | | | | |
|----|-----|-------|--|---------------------|
| 1. | (a) | (i) | portable | [1] |
| | | (ii) | oxygen or air | [1] |
| | (b) | (i) | both have four outer or valency electrons
need to share four more
or need four more to complete energy level
NOT four bonds | [1]
[1] |
| | | (ii) | hard
brittle
high melting or boiling point
poor conductor of electricity or semi-conductor
any TWO
NOT insoluble in water, NOT tough
NOT appearance | [2] |
| | | (iii) | germanium or carbon
NOT graphite | [1] |
| | (c) | (i) | correctly balanced | [1] |
| | | (ii) | lost oxygen
or decrease in oxidation number
NOT accepts electrons unless valid explanation | [1] |
| | | (iii) | 4 oxygen atoms around 1 silicon atom
2 silicon atoms around 1 oxygen
tetrahedral or diagram that looks tetrahedral
If some wrong chemistry, such as ionic MAX
2/3 | [1]
[1]
[1] |
| | | | | TOTAL = [12] |
| 2. | (a) | (i) | USA or Texas or Poland or Mexico or Japan or Ethiopia
Australia or Sicily
accept other sources of sulphur eg petroleum
or natural gas or metal sulphides or volcanoes
NOT coal, NOT underground | [1] |
| | | (ii) | Preserving food or bleaching or sterilising or
disinfecting or making paper or bleaching wood pulp
or wine or jam or fumigation or making paper
NOT making wood pulp | [1] |
| | | (iii) | <u>burnt/roast in oxygen or air</u> | [1] |
| | | (iv) | vanadium(V) oxide or vanadium oxide or platinum
ignore oxidation state of vanadium | [1] |
| | | (v) | Increase temperature (increases rate) but reduces yield
catalyst only increases rate or a catalyst does not
influence position of equilibrium
NOT a definition of a catalyst | [1]
[1] |
| | | (vi) | sulphur trioxide + sulphuric acid = oleum
correct symbol equation acceptable | [1] |
| | | (vii) | $H_2S_2O_7 + H_2O = 2H_2SO_4$ | [1] |

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- (b) (i) potassium [1]
- (ii) ammonium sulphate [1]
- (iii) $\text{Ca}_3(\text{PO}_4)_2$ [1]
- $\text{Ca}(\text{H}_2\text{PO}_4)_2$ [1]
- (iv) only acceptable responses are:
accepts a proton [2]
accepts H^+ [1] only
- TOTAL = [14]**
3. (a) dissolved **or** solution in water [1]
NOT aqueous **NOT** soluble in water
l liquid and g gas [1]
- (b) 6 electrons in bond between two nitrogen atoms [1]
2 electrons on each nitrogen [1]
ignore any coding of electrons with dots **or** crosses
- (c) (i) decreases **or** reaction stops **or** rate becomes zero [1]
- (ii) concentration **or** number of effective collisions
decreases [1]
used up **or** less chemical **or** less collisions etc [1] only
- (iii) greater initial slope [1]
same final point [1]
as long as new curve touches the original curve near
the top allocate the mark
- (iv) greater surface area [1]
- TOTAL = [10]**
- 4 (a) (i) Named soluble zinc salt [1]
corresponding sodium salt [1]
If hydroxide **or** oxide then 0/2
- (ii) Correct equation [2]
not balanced [1] only
- (iii) Correct equation [2]
- (b) (i) $\text{Fe}^{3+} + 3\text{OH}^- = \text{Fe}(\text{OH})_3$ [1]
- (ii) Max at 8cm^3 [1]
Same shape of graph



Just the above shape, the height of the precipitate and the volume of sodium hydroxide are irrelevant [1]

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(iii) Maximum then height of precipitate decreases
or graph slopes down to x axis or comes to zero [1]

hydroxide dissolves in excess or it is amphoteric [1]

TOTAL = [11]

5. (a) Has to be three different uses.

any use that depends on malleability or ductility-
jewellery, pipes, wires, sheets, roofing, ornaments [1]
NOT that it is malleable or ductile

electrical wires or cooking utensils or electrodes [1]
(good) conductor

making alloys or named alloy [1]

(b) (i) $\text{Cu}^{2+} + 2\text{e} = \text{Cu}$ [1]

(ii) gas is oxygen [1]

(copper(II) sulphate) changes to sulphuric acid
or copper ions removed from solution [1]

(c) (i) copper atoms - electrons = copper ions [1]
accept correct symbol equation

(ii) concentration of copper ions does not change or [1]
amount or number of copper ions does not change

copper ions are removed and then replaced [1]
or copper is transferred from anode to cathode

(iii) refining copper or plating (core) [1]
or extraction of boulder copper

TOTAL = [10]

6. (a) (i) correct repeat unit [1]

COND evidence of polymer chain [1]

(ii) glucose or maltose [1]

(iii) addition (polymerisation) or no other product [1]
except polymer

condensation (polymerisation) or polymer [1]
and water

(b) (i) sodium hydroxide [1]

COND ammonia or alkaline gas or litmus red to blue [1]
If aluminium added wc =0

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- (ii) measure pH [1]
more than 1 and less than 7 **or**
correct colour eg orange **or** yellow **NOT** red
NOT green [1]
OR add magnesium **or** calcium carbonate [1]
weak acid reacts slowly
- (c) (i) ethyl acrylate [1]
ester **or** alkene [1]
- (ii) brown to colourless (**NOT** clear) [1]
correct formula for acid **NOT** ester [1]
- TOTAL = [13]**
- 7 (a) Avogadro's Number of particles
or formula mass in grams
or 6×10^{23} particles accept atoms, ions and molecules
or as many particles as there are carbon atoms in 12.00g of ^{12}Ca
ANY one [1]
- (b) (i) moles of Mg = $3/24 = 0.125$
moles of $\text{CH}_3\text{COOH} = 12/60 = 0.200$
magnesium is in excess

OR 3.0g of magnesium react with 15g of acid
only 12.0 g of acid present
magnesium is in excess [3]
- (ii) **Mark conseq to (i) but NOT to any simple integer**
moles of $\text{H}_2 = 0.1$ [1]
- (iii) **Mark conseq to (ii) but NOT to any simple integer**
Volume of hydrogen = 0.1×24
= 2.4 dm^3 [2]
- (c) (i) moles of NaOH = $25/1000 \times 0.4 = 0.01$ [1]
- (ii) **Mark conseq to (i) but NOT to any simple integer**
moles of acid = $0.01/2 = 0.005$ [1]
- (iii) **Mark conseq to (ii) max 10M**
concentration of acid = $0.005 \times 1000/20$ [1]
= 0.25 mol/dm^3 [1]
- TOTAL = [10]**

TOTAL for PAPER = [11] + [14] + [10] + [11] + [10] + [13] + [11] = [80]