June 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0620/03

CHEMISTRY
Extended

UNIVERSITY of CAMBRIDGE
International Examinations

Page 1	Mark Scheme	Syllabus	Paper
	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.

Page 2	Mark Scheme	Syllabus	Paper
	Chemistry – June 2004	0620	3

1. **(a)** **(i)** portable **[1]**

(ii) oxygen **or** air **[1]**

(b) **(i)** both have four outer **or** valency electrons **[1]**
need to share four more **[1]**
or need four more to complete energy level
NOT four bonds

(ii) hard
brittle
high melting **or** boiling point
poor conductor of electricity **or** semi-conductor
any **TWO** **[2]**
NOT insoluble in water, **NOT** tough
NOT appearance

(iii) germanium **or** carbon **[1]**
NOT graphite

(c) **(i)** correctly balanced **[1]**

(ii) lost oxygen **[1]**
or decrease in oxidation number
NOT accepts electrons unless valid explanation

(iii) 4 oxygen atoms around 1 silicon atom **[1]**
2 silicon atoms around 1 oxygen **[1]**
tetrahedral **or** diagram that looks tetrahedral **[1]**
If some wrong chemistry, such as ionic MAX
2/3

TOTAL = [12]

2. **(a)** **(i)** USA **or** Texas **or** Poland **or** Mexico **or** Japan **or** Ethiopia
Australia **or** Sicily **[1]**
accept other sources of sulphur eg petroleum
or natural gas **or** metal sulphides **or** volcanoes
NOT coal, **NOT** underground

(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 **[1]**
NOT making wood pulp

(iii) burnt/roast in oxygen **or** air **[1]**

(iv) vanadium(V) oxide **or** vanadium oxide **or** platinum **[1]**
ignore oxidation state of vanadium

(v) Increase temperature (increases rate) but reduces yield **[1]**
catalyst only increases rate **or** a catalyst does not
influence position of equilibrium **[1]**
NOT a definition of a catalyst

(vi) sulphur trioxide + sulphuric acid = oleum **[1]**
correct symbol equation acceptable

(vii) $H_2S_2O_7 + H_2O = 2H_2SO_4$ **[1]**

(b) **(i)** potassium **[1]**

(ii) ammonium sulphate **[1]**

(iii) $Ca_3(PO_4)_2$ **[1]**

$Ca(H_2PO_4)_2$ **[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 **[1]**
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]

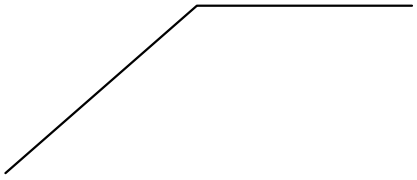
4 **(a)** **(i)** Named soluble zinc salt **[1]**
corresponding sodium salt **[1]**
If hydroxide **or** oxide then 0/2

(ii) Correct equation **[2]**
not balanced **[1]** only

(iii) Correct equation **[2]**

(b) **(i)** $Fe^{3+} + 3OH^- = Fe(OH)_3$ **[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]**

		(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 **NOT** that it is malleable **or** ductile	**[1]**
			electrical wires **or** cooking utensils **or** electrodes (good) conductor	**[1]**
			making alloys **or** named alloy	**[1]**
	(b)	**(i)**	Cu^{2+} + 2e = 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 accept correct symbol equation	**[1]**
		(ii)	concentration of copper ions does not change **or** amount **or** number of copper ions does not change	**[1]**
			copper ions are removed and then replaced **or** copper is transferred from anode to cathode	**[1]**
		(iii)	refining copper **or** plating (core) **or** extraction of boulder copper	**[1]**
				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 except polymer	**[1]**
			condensation (polymerisation) **or** polymer and water	**[1]**
	(b)	**(i)**	sodium hydroxide	**[1]**
			COND ammonia **or** alkaline gas **or** litmus red to blue	**[1]**
			If aluminium added wc =0	

(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 x 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 CH_3COOH = 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 H_2 = 0.1 **[1]**

(iii) **Mark conseq to (ii) but NOT to any simple integer**
Volume of hydrogen = 0.1 x 24
= 2.4 dm^3 **[2]**

(c) **(i)** moles of NaOH = 25/1000 x 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 x 1000/20 **[1]**
= 0.25 mol/dm^3 **[1]**

TOTAL = [10]

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