

June 2003

INTERNATIONAL GCSE

MARKING SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0620/03

CHEMISTRY

(Extended Paper 3)



Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – June 2003	0620	3

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 marking scheme.
- All the candidate's work must show evidence of being marked by the examiner.

- 1 (a) A correct equation either CO or CO₂ as product
If not balanced but otherwise correct [1] ONLY [2]
- (b) (i) C + O₂ → CO₂ NOT word equation [1]
(ii) (higher in furnace) no oxygen left [1]
carbon dioxide reacts with carbon (to give carbon monoxide) [1]
- OR** incomplete combustion of carbon [2]
- OR** either equation gains both marks
CO₂ + C = 2CO or 2C + O₂ = 2CO
- OR** carbon dioxide reacts [1]
with carbon [1]
- (c) limestone + sand → slag [2]
OR calcium carbonate + silicon (IV) oxide → calcium silicate (+ carbon dioxide)
- For knowing that impurity is sand [1] ONLY
- Accept calcium oxide and silicon oxide
Accept lime
- (d) (i) Cutlery **or** chemical plant **or** watches **or** utensils **or** surgical instruments **or**
cars **or** sinks **or** aircraft **or** garden tools [1]
(ii) nickel **or** chromium **or** molybdenum **or** niobium **or** titanium [1]
(iii) blow air/oxygen through
carbon becomes carbon dioxide
carbon dioxide escapes as gas
silicon and phosphorus become oxides
calcium oxide or calcium carbonate
forms slag
Any FOUR NOT blast furnace [4]
- (e) anode tin NOT impure time [1]
cathode iron or steel [1]
tin salt **or** tin ions as electrolyte [1]
NOT oxide or hydroxide or carbonate

TOTAL = 16

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – June 2003	0620	3

- 2 (a) (i) 3 ignore any charges [1]
(ii) high melting **or** boiling point
hard
poor conductor of electricity **or** heat
brittle
Any TWO [2]
NOT insoluble, dull, or malleable
- (iii) carbon, graphite diamond silicon, germanium [1]
silicon (IV) oxide **or** silica **or** silicon dioxide **or** silicon oxide
or sand **or** silicon carbide **or** named polymer [1]
- (iv) four around one [1]
cond looks tetrahedral **or** shows continuation [1]
For graphite layers [1] weak bonds between layers [1]
Accept any macromolecule, no link with (iii)
For polymer repeat unit [1] continuation [1]
- (b) (i) white precipitate [1]
COND upon a precipitate
dissolves in excess or forms solution [1]
- (ii) blue precipitate [1]
COND upon a precipitate
does not dissolve in excess [1]
- (c) (i) number of moles $\text{CO}_2 = 0.24/24 = 0.01$
conseq number of moles of CaCO_3 and $\text{MgCO}_3 = 0.01$
conseq number of moles of $\text{CaCO}_3 = 0.005$ [3]
- (ii) Calculate the volume of hydrochloric acid, 1.0 mole/dm^3 , needed to react with one tablet.
number of moles of CaCO_3 and MgCO_3 in one tablet = 0.01
Expect same as answer to (c)(i). NO marks to be awarded. Just mark consequentially to this response
conseq number of moles of HCl needed to react with one tablet = 0.02 [1]
- conseq** volume of hydrochloric acid, 1.0 mole/dm^3 , needed to react with one tablet = 0.02 dm^3 or 20 cm^3 [1]
- TOTAL = 16**
- 3 (a) (i) Correct equation [2]
For giving correct formula of alkane and alkene [1] only
Accept alkene and hydrogen
- (ii) chlorine [1]
COND light **or** 200°C **or** heat **or** lead tetraethyl
or high temperature MAX 1000°C [1]
ignore comment 'catalyst'
- (b) (i) same molecular formula [1]
different structures **or** structural formulae [1]
- (ii) but-2-ene or cyclobutane [1]
corresponding structural formula [1]
NOT 2-butene
- (c) butanol ignore numbers [1]
butane ignore numbers [1]
dibromobutane ignore numbers [1]

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – June 2003	0620	3

- (d) (i) propene [1]
 $\text{CH}_3\text{—CH}=\text{CH}_2$ [1]
- (ii) Correct structure of repeat unit [1]
 ignore point of attachment of ester group
 COND upon repeat unit
 shows continuation [1]
 If chain through ester group [0] out of [2]
- (iii) do not decay or non-biodegradable
 shortage of sites or amount of waste per year
 visual pollution
 forms methane
 Any TWO [2]
- (iv) form poisonous **or** toxic gases **or** named gas CO, HCl HCN [1]
 NOT carbon dioxide, harmful, sulphur dioxide

TOTAL = 18

- 4 (a) (i) Correct equation [2]
 not balanced [1] ONLY
 $2\text{Pb}(\text{NO}_3)_2 = 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
 $\text{Pb}(\text{NO}_3)_2 = \text{PO} + 2\text{NO}_2 + \frac{1}{2}\text{O}_2$
- (ii) potassium nitrate → potassium nitrite + oxygen [1]
- (b) (i) close **or** tightly packed [1]
 ordered **or** lattice [1]
 vibrational [1]
 NOT forces
- (ii) melting **or** freezing **or** fusion **or** solidification [1]
- (c) (i) oxygen and nitrogen (in air) [1]
 react at high temperatures (and high pressure) [1]
 If nitrogen in fuel [0] out of [2]
- (ii) catalytic converter
 react with carbon monoxide **or** hydrocarbons
 form nitrogen
 ANY TWO [2]
- (d) Add excess lead oxide to nitric acid [1]
 can imply excess
 filter NOT if residue is lead nitrate [1]
 evaporate **or** heat solution [1]

TOTAL = 14

- 5 (a) protons 2
 electrons 2
 neutrons 4 [3]
- (b) (i) $\text{La}^{3+} + 3\text{e}^- = \text{La}$ [1]
 (ii) hydrogen [1]
 bromine NOT Bromide [1]
 caesium hydroxide [1]
 ignore any comments about electrodes

Page 4	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – June 2003	0620	3

- (c) metal hydroxide or hydroxide ions [1]
hydrogen [1]
- (d) correct formula 1Ba to 2Cl
charges correct
8e around the anion
All three points [2]
Two points ONLY [1]
If covalent [0] out [2]
- (e) alternating (positive and negative) [1]
pattern [1]
- (f) (i) barium - oxygen or ionic [1]
(ii) bond forming energy released/exothermic [1]
bond breaking energy taken in/endergonic [1]
more energy released [1]

TOTAL = 17

Total for Paper: 80