

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE O Level

MARK SCHEME for the May/June 2006 question paper

5070 CHEMISTRY

5070/02

Paper 2

maximum raw mark 75

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Page 2	Mark Scheme	Syllabus	Paper
	GCE O Level – May/June 2006	5070	02

Section A

Maximum 45 marks

A1 five names at (1) each

penalise correct formulae once only

- (a) nickel
- (b) aluminium *or* sodium
- (c) aluminium oxide
- (d) nitrogen *or* phosphorus
- (e) iron *or* nickel

[Total: 5]**A2 (a) C****[1]****(b) C****[1]****(c) D and E** both needed for**[1]****(d)** six entries to the table:

all six correct (2)

five correct (1)

less than five (0)

[2]

	atom	ion
protons	19	19
electrons	19	18
neutrons	20	20

[Total: 5]

Page 3	Mark Scheme	Syllabus	Paper
	GCE O Level – May/June 2006	5070	02

A3 (a) (i) one characteristic: (1)

e.g. same chemical reactions gradation in physical properties
differ by CH_2

not has a general formula

(ii) formula is C_nH_{2n}
not $(\text{CH}_2)_n$ (1)

[2]

(b) (i) equation : $2\text{C}_3\text{H}_6 + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$

all symbols correct (1)

correct balance (1)

(ii) substitution reaction (1)

[3]

(c) name propene *or* propylene (1)

correct structure with double bond shown and all H atoms indicated (1)

[2]

[Total: 7]

A4 (a) equation: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ [1]

(b) (i) equation: $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$ (1)

(ii) name is calcium carbonate (1)

[2]

(c) any one large scale use e.g.

making mortar/ making plaster/ for limewash/ softening water/ reduce soil acidity/
neutralise acid soil/ manufacture of sodium carbonate/ washing soda/ making bleaching
powder/ removing acidic gases or removing acidic waste in industry

[1]

(d) calculation [3]

- M_r of Ca_3SiO_5 is 228, Ca(OH)_2 - 74
- 456 g Ca_3SiO_5 gives 222 g Ca(OH)_2 (mark for correct ratio)
- 912 g Ca_3SiO_5 gives 444 g Ca(OH)_2

[Total: 7]

Page 4	Mark Scheme	Syllabus	Paper
	GCE O Level – May/June 2006	5070	02

A5 (a) formula is SiC [1]

(b) graphite has free / delocalised / mobile electrons (1)
SiC does not (1)

[2]

(c) (i) SiC has many strong /covalent bonds (1)

(ii) diamond has stronger bonds (1)

[2]

(d) answer 4.40 g [1]

[Total: 6]

A6 (a) two observations at (1) each:
floats/on the surface moves bubbles dissolves/disappears [2]

(b) equation: $2\text{Li} + 2\text{H}_2\text{O} \rightarrow 2\text{LiOH} + \text{H}_2$ [1]

(c) electron loss is oxidation or oxidation is an increase in O.N. [1]

(d) two observations
explodes/pops burns/flame [2]

[Total: 6]

A7 (a) (i) graphs are (roughly) similar
or high CO₂ matches high temperatures (1)

(ii) two effects at (1) each:
melting of polar ice or rise in sea levels
desertification/extreme climate changes/effect on animal/plant habitats(2)

[3]

(b) dot and cross for CO₂
all dots (1) only no double bond (0) (2)

[2]

(c) (i) name methane (1)

(ii) cow flatulence or decay of vegetation (1)

(iii) two points from
ozone absorbs u.v. light/protects against u.v. light
CFC's or chlorine atoms react with ozone
CFCs deplete the ozone layer/reduce the amount of ozone (2)

[4]

[Total: 9]

[Total for Section A: 45]

Page 5	Mark Scheme	Syllabus	Paper
	GCE O Level – May/June 2006	5070	02

Section B

Answer any three questions

B8 (a) source is fertilisers *or* detergents [1]

(b) any three points from four

- algal bloom forms
- this blocks sunlight
- water plants die
- bacteria remove oxygen from the water

[3]

(c) (i) *either* add *Al* and NaOH and warm
 NH_3 turns litmus blue

or add conc. H_2SO_4 and FeSO_4
 brown ring forms

(2)

(ii) nitrate ion too dilute

(1)

[3]

(d) calculation

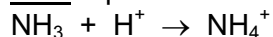
$$\begin{array}{ll}
 \text{mols of } \text{I}_2 \text{ is } & 0.508 / (2 \times 127) = 0.002 \\
 \text{mols of } \text{O}_2 \text{ is } & 0.002 / 2 = 0.001 \\
 \text{conc. of } \text{O}_2 \text{ is } & 0.001 / 2 = 0.0005 \text{ mol dm}^{-3}
 \end{array}$$

[3]

[Total: 10]

Page 6	Mark Scheme	Syllabus	Paper
	GCE O Level – May/June 2006	5070	02

B9 (a) ionic equation



allow full ionic equation showing spectator ions

ignore incorrect state symbols

[1]

(b) preparation of KCl

- correct reagents: HCl(aq) and KOH(aq) *or* $\text{K}_2\text{CO}_3\text{(aq)}$ *or* $\text{KHCO}_3\text{(aq)}$
- (description of a) titration
- repeat without the indicator
- evaporate to crystallise *or* to dryness

[4]

(c) $M_r \text{K}_2\text{CO}_3 = 138 + \text{K}_2\text{SO}_4 = 178$ (or moles $\text{K}_2\text{CO}_3 = 3.45/138 = 0.025$);
 $1 \times 138\text{g K}_2\text{CO}_3 \rightarrow 1 \times 178\text{g K}_2\text{SO}_4$ (or moles $\text{K}_2\text{SO}_4 = 0.025$);
 $3.45\text{g K}_2\text{CO}_3 \rightarrow 3.45 \times 178 / 138\text{g K}_2\text{SO}_4 = 4.35\text{g}$
 (or mass $\text{K}_2\text{SO}_4 = 0.025 \times 174 = 4.35\text{g}$)

[3]

(d) potassium ion K^+ structure 2.8.8 (1)

chloride ion Cl^- structure 2.8.8 (1)

2.8.8 for both with K and Cl shown in centre (1);
 correct charges (1)

[2]

[Total: 10]

Page 7	Mark Scheme	Syllabus	Paper
	GCE O Level – May/June 2006	5070	02

B10(a) atoms in brass do not slide as easily [1]

- (b) (i) colour is blue (1)
- (ii) any 5 of:
- blue precipitate;
 - $\text{Cu}^{2+} + 2\text{OH}^- \rightarrow \text{Cu}(\text{OH})_2$
ALLOW: full equation
 - white precipitate masked by blue one/ ppt lighter blue in colour than with copper hydroxide alone
 - $\text{Zn}^{2+} + 2\text{OH}^- \rightarrow \text{Zn}(\text{OH})_2$
ALLOW: full equation
 - precipitates are copper hydroxide and zinc hydroxide **or** correct formulae (can be from the equations)
 - part of the precipitate redissolves in excess (sodium hydroxide)/ ppt of zinc hydroxide redissolves in excess (sodium hydroxide)
- [6]

- (c) (i) names: **B** is zinc chloride (1)
C is copper (1)
- (ii) ionic equation (1)
- $$\text{Zn} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2$$

[3]

[Total: 10]

B11(a) ester linkage [1]

- (b) (i) monomers are amino acids (1)
- (ii) nylon is hydrolysed (by the acid) (1)
- [2]

- (c) (i) structure of pvc: (1)
- $$-(\text{CH}_2 - \text{CHCl})_n-$$
- or full structure
- (ii) weak forces between the molecules (1)
- allow weak van der Waals forces between molecules
- (iii) (orange) bromine is decolourised (1)
it is an addition reaction (1)
pvc has no double bonds (1)
- [5]

- (d) two from:
- polythene is not biodegradable (1)
causes litter *or* use of land fill sites (1)
toxic/poisonous fumes if burnt (1)
- [2]

[Total: 10]