

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**June 2003**

**INTERNATIONAL GCSE**

**MARKING SCHEME**

**MAXIMUM MARK: 40**

**SYLLABUS/COMPONENT: 0620/01**

**CHEMISTRY**

**(Multiple Choice)**



<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	<b>C</b>	21	<b>B</b>
2	<b>B</b>	22	<b>D</b>
3	<b>A</b>	23	<b>A</b>
4	<b>D</b>	24	<b>B</b>
5	<b>A</b>	25	<b>D</b>
6	<b>C</b>	26	<b>B</b>
7	<b>A</b>	27	<b>D</b>
8	<b>A</b>	28	<b>D</b>
9	<b>B</b>	29	<b>D</b>
10	<b>C</b>	30	<b>B</b>
11	<b>B</b>	31	<b>D</b>
12	<b>D</b>	32	<b>D</b>
13	<b>C</b>	33	<b>A</b>
14	<b>D</b>	34	<b>A</b>
15	<b>B</b>	35	<b>B</b>
16	<b>C</b>	36	<b>A</b>
17	<b>A</b>	37	<b>A</b>
18	<b>C</b>	38	<b>B</b>
19	<b>A</b>	39	<b>C</b>
20	<b>C</b>	40	<b>C</b>

**TOTAL 40**

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

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**INTERNATIONAL GCSE**

**MARKING SCHEME**

**MAXIMUM MARK: 80**

**SYLLABUS/COMPONENT: 0620/02**

**CHEMISTRY**

**(Core Paper 2)**



- 1 (a) (i) Fe/Cu ALLOW Zn [1]  
(ii) C/N/S/F/C/Br [1]  
(iii) O/S [1]  
(iv) C [1]  
(v) Li/Na/K ALLOW F [1]  
(vi) CU/Zn/Br/Kr [1]
- (b) argon - light bulbs;  
chlorine - kills bacteria;  
carbon - as lubricant;  
helium - in balloons [4]
- (c) (i) covalent [1]  
(ii) BrF<sub>5</sub> ALLOW F<sub>5</sub>Br [1]  
(iii) ions/charged particles;  
NOT: particles  
not free to move in solid/free to move in molten/liquid state [2]
- 2 (a) drop small tube in acid/loosen string/idea of mixing zinc and acid/let go of cotton  
ALLOW: cut the string [1]  
NOT: heat (the acid)  
NOT: pull the string
- (b) (i) correct plotting including 0-0 point (- 1 per omission or error) [2]  
(ii) best curve drawn and to go through origin [1]  
(iii) no more gas produced/reaction finished;  
all zinc reacted/used up [2]
- (c) graph drawn with faster initial rate and starting at 0-0;  
ALLOW: straight line as initial rate  
ends up at 55 cm<sup>3</sup> [2]
- (d) (i) 2 (HCl) [1]  
(ii) zinc chloride [1]  
(iii) 136 [1]  
IGNORE units
- (e) substance containing only one type of atom/substance which cannot be broken down to any other substance by chemical means [1]  
NOT 'can't be split' alone  
NOT is a pure substance
- 3 (a) (i) evaporation/vaporisation/boiling [1]  
(ii) freezing/solidification [1]  
NOT: fusion  
(iii) condensing/condensation/liquefaction [1]
- (b) 2<sup>nd</sup> box ticked [1]
- (c) A;  
energy needed to overcome forces between molecules/idea of energy input/  
taking in heat [2]
- (d) (i) chlorine [1]  
(ii) bromine [1]  
(iii) sodium chloride [1]

- (e) (i) diffusion [1]  
NOT: Brownian motion
- (ii) ammonium chloride [1]  
NOT: ammonia chloride
- (iii) ammonia diffuses or moves faster/HCl diffuses or moves slower/ammonia has lower mass/HCl higher mass/molecules of HCl and ammonia move at different speeds [1]  
NOT: ammonia evaporates faster/HCl evaporates more slowly
- (f) neutralisation/acid base [1]  
NOT: exothermic  
NOT: addition
- (g) (i) thermometer [1]  
(ii) reference to the solid or melting point of the solid is needed for the mark. boiling point of water too low to get solid to melt/boiling water cannot get to 155°C [1]  
NOT: boiling point of water is only 100°C/boiling point of water too low.  
NOT: water boils off first
- (iii) so that the liquid is the same temperature throughout/no hot or cold spots/so the tube is the same temperature as the thermometer/so heat can circulate in all places [1]  
ALLOW: so that temperature of liquid is balanced  
NOT: to keep temperature constant
- 4 (a) (i) breaking down of molecules substances using heat [1]  
(ii) substance which speeds up a reaction [1]  
NOT: alters/changes rate of reaction  
NOT: speeds up and slows down rate
- (b) ethene/ethylene [1]  
NOT: formula
- (c) (i) paraffin [1]  
(ii) 4000g/4kg [1]  
(correct unit needed)
- (iii) C<sub>2</sub>H<sub>4</sub>; H<sub>2</sub> [2]
- (d) (i) two units polymerised with continuation bonds at either end and hydrogen atoms drawn [1]  
ALLOW: -CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>-  
ALLOW: -[-CH<sub>2</sub>CH<sub>2</sub>-]<sub>n</sub>  
ALLOW: -[-CH<sub>2</sub>-]<sub>n</sub>
- (ii) addition (polymerisation) [1]
- 5 (a) (sodium) hydroxide/ammonia; → green/grey green; [2]  
silver nitrate; → yellow; [2]  
ALLOW: lead nitrate NOT: cream  
ALLOW: bubble chlorine → grey/black (precipitate)  
silver nitrate; → white; [2]  
barium chloride/nitrate; → white; [2]  
ALLOW: lead acetate

- (b) filtration/filtering or diagram of correct apparatus for filtration (filter paper must be present on diagram)  
 NOT: decanting  
 sodium chloride through filter paper/shown on diagram;  
 NOT: filtrate through filter paper  
 evaporate off water from sodium chloride/suitable diagram [3]  
 ALLOW: distilling off water
- (c) different atoms/elements  
 (chemically) joined/bonded/combined (both points needed)  
 (reference to mixtures = 0 unless qualified enough in time frame e.g. a mixture of elements which are then chemically combined) [1]
- (d) (i) chlorine/ $Cl_2$  [1]  
 (ii) sodium/Na [1]
- 6 (a) potassium/magnesium/aluminium [1]
- (b) they did not have electricity/did not know about electrolysis/did not know the metal existed [1]  
 NOT: did not have the right technology
- (c) (i) indication that bubbles produced rapidly or quickly/slower than magnesium but faster than zinc [1]  
 OR number of bubbles produced intermediate between magnesium and zinc; uranium dissolved slower than magnesium but faster than zinc/dissolves at medium rate etc. [1]  
 (ii) atoms of same element with different mass number/different number of neutrons/different nucleon number [1]  
 NOT: compounds/molecules with different mass number  
 (iii) indication of use for energy – nuclear power stations/nuclear energy [1]  
 ALLOW: atomic/nuclear bombs  
 NOT: curing cancer/medical uses  
 NOT: 'for fuel'
- (d) magnesium oxide [1]  
 ALLOW: MgO
- (e) (i) idea of mixture of (different) metals [1]  
 (ii) alloys harder/stronger/decreased malleability/increased toughness/increased corrosion resistance/heat or electrical resistance increased [1]  
 NOT: increase in melting point  
 NOT: cheaper  
 NOT: improving properties
- (f) removes oxygen from zinc oxide [1]  
 ALLOW: definition of reduction involving oxidation numbers/electron transfer
- (g) (i) reversible reaction [1]  
 ALLOW: equilibrium  
 (ii) 76-80% [1]
- (h) (i) correct electronic structure of Mg (2.8.2) on diagram [1]  
 (ii) loses two electrons/loses its valence electrons = 2  
 forms  $Mg^{2+}$  ion = 1  
 loses electron(s) = 1 [2]  
 forms  $Mg^{2+}$  ion by losing electrons = 2

**CAMBRIDGE**  
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**June 2003**

**INTERNATIONAL GCSE**

**MARKING SCHEME**

**MAXIMUM MARK: 80**

**SYLLABUS/COMPONENT: 0620/03**

**CHEMISTRY**

**(Extended Paper 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 CO<sub>2</sub> as product  
If not balanced but otherwise correct [1] ONLY [2]
- (b) (i) C + O<sub>2</sub> → CO<sub>2</sub> 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  
CO<sub>2</sub> + C = 2CO or 2C + O<sub>2</sub> = 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**



- 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  $\text{CaCO}_3$  and  $\text{MgCO}_3 = 0.01$   
**conseq** number of moles of  $\text{CaCO}_3 = 0.005$  [3]
- (ii) Calculate the volume of hydrochloric acid,  $1.0 \text{ mole/dm}^3$ , needed to react with one tablet.  
number of moles of  $\text{CaCO}_3$  and  $\text{MgCO}_3$  in one tablet = 0.01  
Expect same as answer to (c)(i). NO marks to be awarded. Just mark sequentially to this response  
**conseq** number of moles of  $\text{HCl}$  needed to react with one tablet = 0.02 [1]
- conseq** volume of hydrochloric acid,  $1.0 \text{ mole/dm}^3$ , needed to react with one tablet =  $0.02 \text{ dm}^3$  or  $20 \text{ cm}^3$  [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**  $200^\circ\text{C}$  **or** heat **or** lead tetraethyl  
**or** high temperature MAX  $1000^\circ\text{C}$  [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]

- (d) (i) propene [1]  
 $\text{CH}_3\text{—CH=CH}_2$  [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

- (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**



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**MARKING SCHEME**

**MAXIMUM MARK: 40**

**SYLLABUS/COMPONENT: 0620/05**

**CHEMISTRY**

**(Practical)**



- 1 Table of results
- Experiment 1 Initial and final readings recorded [1]  
to 1 decimal place [1]
- Experiment 2 Initial and final readings recorded [1]  
to 1 decimal place [1]
- Results comparable to Supervisor's results  $\pm 1 \text{ cm}^3$  [2]
- (a) red/burgundy/brown [1]
- (b) yellow (1) to blue/black (1) see Supervisor [2]  
IGNORE green
- (c) (i) Experiment 1 [1]  
(ii)  $\Delta 2 \times$ , double volume (1) in Experiment 1 (1) not just more [2]  
(iii) potassium iodate less concentrated solution **C** than **B** or vice versa [1]  
not different concentrations  
(iv)  $2 \times$  volume from table for Experiment 1 (1) unit (1) [2]  
 $2 \times$  iodine formed [1]
- (d) Indicator (1) reference to accuracy (1)/end-point/see more clearly [2]  
not test for  $\text{I}_2/\text{I}^-$

[Question total: 18]

- 2 (a) bubbles/condensation/goes black max 2 [2]
- (b) filtrate - colourless not clear [1]  
residue - green [1]
- (c) (i) effervescence/fizz/bubbles [1]  
limewater  $\rightarrow$  milky [1]  
solution is blue [1]  
(ii) blue (1) precipitate (1) [2]  
royal/deep blue (1) solution (1) [2]
- (d) (i) white (1) precipitate (1) dissolves in excess (1) [3]  
(ii) white (1) precipitate (1) dissolves (1) [3]  
(iii) white precipitate (1) [1]
- (e) zinc (1) sulphate (1) reversed = 0 [2]
- (f) copper (1) carbonate (1) reversed = 0 [2]  
hydrated (1) max 2

[Question total: 22]

[Total for paper: 40]

Results obtained for Question 1/cm<sup>3</sup>

	1 <sup>st</sup>	2 <sup>nd</sup>
Experiment 1	16.5	16.3
Experiment 2	8.3	8.2

**CAMBRIDGE**  
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**MARKING SCHEME**

**MAXIMUM MARK: 60**

**SYLLABUS/COMPONENT: 0620/06**

**CHEMISTRY**

**(Alternative to Practical)**



- 1 (a) A = mortar (1)  
 B = stirrer/stirring rod (1) not thermometer  
 C = tripod (1)  
 D = Bunsen Burner (1) [4]
- (b) filtration [1]
- (c) D or description [1]
- 2 (a) because precipitate formed/goes cloudy (1)  
 sulphur (1)/turbid [2]
- (b) reference to fair test/comparison/same depth [1]
- (c) sodium thiosulphate/water 1<sup>st</sup>/2<sup>nd</sup> acid, last [1]
- (d) (i) all points correct (3), -1 for any incorrect  
 smooth line (1)  
 label (1) [5]
- (ii) line lower down (1)  
 does not touch other line (1) [2]
- (e) times would be longer (1) because solution more spread out/reference to  
 surface area/depth (1) [2]
- 3 Table of results  
 correct burette readings in table (3) or 17.2, 18.9, 26.5  
 i.e. 16.8, 17.1 and 25.5  
 Differences correctly completed (1) Difference 7.6  
 i.e. 8.4 [4]
- (a) (i) Experiment 1 [1]  
 (ii) twice volume/more than twice as much [1]  
 (iii) Solution B was 2x (1) concentration of C (1) or similar  
 B more concentrated than C (1 only) [2]  
 (iv) volume A = 33.6 (1) cm<sup>3</sup> (1)/34.4cm<sup>3</sup>  
 2x iodine produced (1) [3]
- (b) reference to accuracy (1) indicator (1)/easier to see  
not test for I<sub>2</sub> max 2 [2]
- 4 (c) effervescence/fizz/bubbles (1)  
 limewater milky (1)/blue solution [2]
- (d) (ii) blue (1) precipitate (1)  
 royal/dark blue (1) solution (1) [4]
- (e) (i) white (1) precipitate (1)  
 dissolves (1) [3]  
 (ii) white (1) precipitate (1)  
 dissolves (1) [3]
- (f) Solid D is a sulphate (1) hydrated (1) [2]
- (g) copper (1)/Cu<sup>2+</sup> (2) [2]



- 5 (a) (i) Smooth line graph [1]  
(ii) result at 5 minutes (1)  
not on curve (1)/gas escapes, gone down [2]
- (b) 0.8 g [1]
- (c) reference to leak/loss of gas (1)  
∴ volumes lower (1) [2]
- 6 Known mass of beach sand (1)  
add excess (1) dilute hydrochloric acid (1)  
filter (1) wash (1) dry (1) residue  
and weigh sand (1) working out result (1)  
max 6 of 8 [6]

**[Total: 60]**

**Grade thresholds** taken for Syllabus 0620 (Chemistry) in the June 2003 examination

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 1	40	-	26	20	17
Component 2	80	-	52	36	27
Component 3	80	53	31	-	-
Component 5	40	31	24	18	14
Component 6	60	42	32	21	15

The threshold (minimum mark) for B is set halfway between those for Grades A and C.

The threshold (minimum mark) for D is set halfway between those for Grades C and E.

The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.

Grade A\* does not exist at the level of an individual component.