

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

**MARK SCHEME for the November 2004 question paper**

**0620 CHEMISTRY**

**0620/02**

**Paper 2 (Core Theory), maximum mark 80**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the November 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.



**Grade thresholds** taken for Syllabus 0620 (Chemistry) in the November 2004 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 2	80	N/A	52	40	33

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.



November 2004

**INTERNATIONAL GCSE**

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0620/02

CHEMISTRY  
(Core Theory)



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- 1 (a) increases;  
some comment that the trend is irregular/only approximate e.g.  
potassium (or sodium) do not follow the trend/boiling point of sodium  
high/boiling point of potassium too low [2]
- (b) allow 670-714°C (actual = 686°C) [1]
- (c) allow 0.260-0.300 (nm) (actual = 0.272 nm) [1]
- (d) slower (than sodium)/less rapid/gently etc.  
ALLOW: slow [1]
- (e) any three properties from:  
conduct (heat/electricity); malleable; ductile; shiny; sonorous  
ALLOW: solid at room temperature  
NOT: strong; high melting/boiling points; high density [3]
- (f) (i) sodium hydroxide [1]
- (ii) lighted splint:  
pops/explodes/squeaky sound [2]  
(2<sup>nd</sup> mark CONDITIONAL on 1<sup>st</sup>)
- (g) (i) proton(s) [1]
- (ii) isotope(s) [1]
- (iii) 3 [1]
- (iv) any suitable use e.g.  
radioactive tracer/cancer therapy/sterilising medical equipment [1]  
ALLOW: kills bacteria  
NOT: X-rays
- 2 (a) A + D [1]
- (b) C + E [1]
- (c) C<sub>5</sub>H<sub>10</sub> [1]
- (d) correct formula for 1,2 – dibromoethane showing all atoms and bonds [1]  
ALLOW: correct dot and cross diagram

Page 2	Mark Scheme	Syllabus	Paper
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- (e) (i) 5 and 6 [1]
- (ii) respiration [1]
- (iii) decreases it/slows it  
ALLOW: ethane breaks down [1]  
NOT: stops it
- (iv) diffusion [1]
- (v) removes the ethene/blows the ethene away/reduces the amount of ethene OWTTE [1]  
ALLOW: dilutes ethene
- (vi) biological/protein/description of protein;  
NOT: an organism/a bacterium/natural catalyst  
catalyst/description of catalyst [2]
- (f) (i) chromatography [1]
- (ii) S [1]
- (iii) R + T [1]
- 3 (a) measuring cylinder [1]  
ALLOW: burette/volumetric pipette  
NOT: pipette; cylinder
- (b) so that all the (sulphuric) acid reacted/used up [1]  
NOT: ensure that reaction is complete
- (c) carbon dioxide/gas given off [1]  
NOT: there is a reaction
- (d) filter funnel;  
filter paper;  
beaker underneath [3]  
  
-1 mark if at least two parts not correctly labelled  
If no filter paper = 0  
If filter paper shown flat at top of funnel, max =1 (if at least two labels are correct)
- (e) filtrate [1]
- (f) evaporate/boil off (some off) the water/allow to crystallise in a warm place/leave in a warm place;  
NOT: evaporate solution/evaporate nickel sulphate  
NOT: heat (alone) unless qualified  
dry with filter paper/pick out crystals and dry; [2]  
NOT: heat/warm to dry

Page 3	Mark Scheme	Syllabus	Paper
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- (g) (i)  $7\text{H}_2\text{O}$  [1]
- (ii) equilibrium/reversible reaction [1]  
NOT: goes back to original form/state  
NOT: goes two ways
- (iii) add (a little) water [1]
- 4 (a) nitrogen [1]
- (b) (i) oxygen;  
water. [2]  
NOT: symbols
- (ii) carbon and hydrogen [1]  
ALLOW: symbols
- (iii) alkanes [1]
- (c) incomplete combustion (of hydrocarbons/fuels)/insufficient oxygen [1]  
for combustion  
NOT: lack of oxygen
- (d) (i)  $2 + 2$  [1]
- (ii) any suitable e.g. breathing difficulties/irritation of throat/irritation [1]  
of lungs/damage to lungs/watering eyes etc  
NOT: causes lung diseases  
ALLOW: suitable affects of acid rain if clearly stated that  $\text{NO}_2$  dissolves in  
water first  
NOT: kills organisms/animals  
NOT: affects lungs/eyes etc.
- (e) (i) burning coal [1]  
ALLOW: burning fossil fuels
- (ii) addition of oxygen [1]  
ALLOW: removal/loss of electrons
- (iii) 98 [1]
- (iv) iron sulphate/iron(II) sulphate; [2]  
NOT: iron(III) sulphate  
hydrogen
- (v) erodes them/wears them away [1]  
ALLOW: answers involving relevant chemical reactions (e.g.  
calcium carbonate + acid) in context  
NOT: corrodes  
NOT: deteriorates  
NOT: cracks them/destroys them

Page 4	Mark Scheme	Syllabus	Paper
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- 5 (a) (i) increases growth/increases crop yield [1]  
NOT: for plant growth/helps growth/provides nutrients for growth/  
makes them grow faster/better
- (ii) potassium/K/K<sup>+</sup> [1]
- (iii) phosphate [1]
- (b) add (aqueous) sodium hydroxide;  
and aluminium foil/Devarda's alloy;  
warm/test with red litmus/smell gas;  
ammonia produced/pungent smell/litmus turns blue [4]
- (4<sup>th</sup> mark only allowed if reagents correct)  
(warm gains no credit unless reagents correct)
- OR
- add iron(II) sulphate;  
and concentrated:  
sulphuric acid;  
brown ring (where the two layers meet)
- (c) (i) neutralisation/acid-base [1]  
ALLOW: exothermic
- (ii) NH<sub>3</sub> [1]
- (d) 2<sup>nd</sup> and 4<sup>th</sup> boxes ticked (1 each) [2]
- 6 (a) 3<sup>rd</sup> box down ticked [1]
- (b) (i) breaking down/decomposition of a substance/compound using  
electricity [1]  
NOT: separation of ions using electricity
- (ii) negative/cathode [1]
- (iii) graphite [1]  
ALLOW: carbon/platinum  
NOT: copper
- (c) (i) electron [1]
- (ii) (acidify with nitric acid) add silver nitrate solution;  
white precipitate [2]
- (d) 2 [1]
- (e) (i) 2550 [1]
- (ii) 3.6% [1]

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- (f) (i) unsaturated;  
catalyst;  
saturated [3]
- (ii) any suitable use e.g.  
fuel/specific reductions (e.g. alkenes (to alkanes)/Haber process) [1]  
ALLOW: in balloons/airships/rockets  
ALLOW: in making hydrochloric acid  
ALLOW: in oxy-hydrogen blowpipe  
NOT: making water/making margarine