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.

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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^{o}C (actual = 686^{o}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^{nd} mark CONDITIONAL on 1^{st})

(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_5H_{10} **[1]**

(d) correct formula for 1,2 – dibromoethane showing all atoms and bonds **[1]**
ALLOW: correct dot and cross diagram

(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
ALLOW: burette/volumetric pipette **[1]**
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 <u>solution</u>/evaporate nickel sulphate
NOT: heat (alone) unless qualified
dry with filter paper/pick out crystals and dry; **[2]**
NOT: heat/warm to dry

(g) **(i)** $7H_2O$ **[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
ALLOW: symbols **[1]**

(iii) alkanes **[1]**

(c) incomplete combustion (of hydrocarbons/fuels)/insufficient oxygen for combustion **[1]**
NOT: lack of oxygen

(d) **(i)** 2 + 2 **[1]**

(ii) any suitable e.g. breathing difficulties/irritation of throat/irritation of lungs/damage to lungs/watering eyes etc **[1]**
NOT: causes lung diseases
ALLOW: suitable affects of acid rain if clearly stated that NO_2 dissolves in water first
NOT: kills organisms/animals
NOT: affects lungs/eyes etc.

(e) **(i)** burning coal
ALLOW: burning fossil fuels **[1]**

(ii) addition of oxygen **[1]**
ALLOW: removal/loss of electrons

(iii) 98 **[1]**

(iv) iron sulphate/iron(II) sulphate;
NOT: iron(III) sulphate
hydrogen **[2]**

(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

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^+ **[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^{th} 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
ALLOW: exothermic **[1]**

(ii) NH_3 **[1]**

(d) 2^{nd} and 4^{th} boxes ticked (1 each) **[2]**

6 **(a)** 3^{rd} 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
ALLOW: carbon/platinum **[1]**
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]**

(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