UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the June 2005 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*.

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Grade thresholds for Syllabus 0620 (Chemistry) in the June 2005 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 2	80	N/A	57	42	31

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.

June 2005

IGCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0620/02

CHEMISTRY
(Core Theory)

UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** **(i)** A **[1]**

(ii) B + E **[1]**

(iii) A + C **[1]**

(iv) B **[1]**

(v) B + E **[1]**

(b) **(i)** graphite **[1]**
NOT: charcoal

(ii) diamond/buckminsterfullerene **[1]**
NOT: graphite (but ALLOW: ecf from part **(i)**

(c) NaI **[1]**
ALLOW: Na^+I^-
NOT: $Na^+ + I^-$

(d) compound (no mark)
because two different (types of) atoms joined/bonded etc. **[1]**
ALLOW: two different elements bonded
NOT: atoms together

Total = 9

2 **(a)** filtering/filtration **[1]**
NOT: distillation, NOT: decanting

(b) litmus turns pink/red **[1]**
NOT: orange

(c) **(i)** steel **[1]**

(ii) water **[1]**
NOT: steam

(iii) copper/iron **[1]**

(iv) natural gas **[1]**
NOT: methane

(d) methane **[1]**

(e) 100^o C (100 = 0) **[1]**

(f) **(i)** calcium/Ca^{2+} **[1]**

(ii) e^- **[1]**
ALLOW: e
NOT: electron

(g) **(i)** carbon dioxide + water **[1]**
ACCEPT: correct formulae

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(ii) carbon monoxide **[1]**
NOT: CO

Total = 12

3 **(a)** random arrangement;
far apart. **[2]**

(b) pH9 **[1]**

(c) **(i)** NH_3/H_3N **[1]**

(ii) covalent **[1]**

(iii) weak forces between particles OR molecules/weak intermolecular forces **[1]**

(d) **(i)** H_2SO_4 **[1]**

(ii) nitrogen; soil **[2]**

(e) Any 3 from:

ammonia evaporates from (ammonia) solution;
diffusion;
particles/molecules of ammonia/gases are in constant movement/
move freely; ALLOW: move fast
NOT: particles of ammonia solution move freely
NOT: move from high to low concentration
movement of particles/molecules is random. **[3]**
NOT: ammonia spreads out;

(f) **(i)** the air **[1]**
ALLOW: atmosphere

(ii) 2 (NO_2) **[1]**

(iii) reversible reaction **[1]**
ALLOW: equilibrium

(iv) exothermic/heat given out **[1]**

Total = 16

4 **(a)** monomers **[1]**

(b) does not have a double bond/only contains single bonds/has a single C – C bond **[1]**
NOT: has a single bond
NOT: it is saturated
NOT: no spare bonds

(c) displayed/graphical formula correct **[1]**
ALLOW: correct dot and cross diagrams

(d) **(i)** breaking down of long-chained hydrocarbons/formation of smaller hydrocarbons from larger **[1]**

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(ii) high temperature **[1]**
ALLOW: heat
(catalyst alone = 0)

(iii) C_8H_{18} **[1]**
ALLOW: other sensible combinations $2(C_2H_4) + C_6H_{14}$

(e) (i) H_2 **[1]**

(ii) any 2 of:

temperature gradient in fractionation column;
smaller/lighter molecules (rise) higher in column OR smaller/lighter molecules more easily vaporised
OR e.g. referring to larger/heaver molecules
ALLOW: hydrocarbons in place of molecules
NOT: lighter/heavier fractions
different fractions condense at particular heights in column/fractions condense when temperature falls below their boiling points **[2]**
ALLOW: different fractions have different boiling points/condense at different temperatures

(iii) petrol: fuel (for cars)/other suitable use **[1]**
NOT: for cars etc.
lubricating fraction: lubricating oils/waxes/polishes/other suitable use **[1]**
NOT: for planes etc.

Total = 11

5 (a) (i) molecule containing 2 atoms **[1]**
ALLOW: element containing 2 atoms

(ii) whether it is solid, liquid or gas (all 3 needed) **[1]**

(b) (i) gas; liquid; solid
(all 3 = 2 marks; 2 correct = 1 mark) **[2]**

(ii) red/brown/orange or combination of these **[1]**

(iii) 130-210 (^{o}C) (actual = +184 ^{o}C) **[1]**

(c) iodine + potassium chloride (1 each) **[2]**

(d) (i) 8 electrons in each shell + atoms joined
no bonding electrons = 1 **[2]**
IGNORE: inner shell electrons if correct
(incorrect inner shell electrons = 1 max)

(ii) water purification OR treatment/killing bacteria etc./bleaching agent (for paper)/ making refrigerants/making organic chlorine compounds (named)/making solvents/extracting titanium/detinning scrap tinplate/making hydrochloric acid/extraction of bromine from seawater/other suitable use **[1]**

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(e) **(i)** A **[1]**

(ii) C **[1]**

(iii) it contains ions; which can move/are free to move (OWTTE) **[2]**
reference to electrons = 0

(f) **(i)** Period 6 **[1]**

(ii) 85 **[1]**

(iii) atoms with (same number of protons and) different number of neutrons/ different mass number/different nucleon number **[1]**
NOT: molecules with…
ALLOW: elements with….

(iv) 125 **[1]**

Total = 19

6 **(a)** **(i)** iron + sulphuric acid → iron sulphate + hydrogen **[2]**
-1 per error/omission
NOT: iron(III) sulphate
NOT: hydrogen sulphate

(ii) lighted splint;
pop/small explosion etc. **[2]**
(consequential marking)

(b) **(i)** cathode **[1]**

(ii) allows conduction (of electricity)/allows charges or ions to flow through the solution **[1]**

(iii) gains layer of copper/coated with copper
NOT: gets bigger **[1]**
decreases in size/gets smaller/loses copper etc. **[1]**
ALLOW: the copper dissolves
NOT: breaks up/flakes off

(iv) aqueous sodium hydroxide; light blue ppt; insoluble in excess
OR aqueous ammonia; light blue ppt; soluble in excess/forming dark blue solution **[3]**
(consequential marking)

(c) to make them attractive/makes them shiny/protects the iron so it does not rust/does not corrode OR oxidise easily/less reactive than iron **[1]**
NOT: chromium is unreactive etc.
NOT: other properties of chromium e.g. hard
NOT: corrosive

(d) iron > chromium > copper **[1]**

Total = 13

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