UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the June 2005 question paper

0620 CHEMISTRY

0620/03 **Paper 3 (Extended 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 3	80	58	30	16	11

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: 0620/03

CHEMISTRY
Extended Theory

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1 (a) (i) darker **or** actual colours **[1]**
chlorine yellow, yellow/green
bromine orange, brown, brownish red
iodine black grey, purple

(ii) gas, liquid, solid **[1]**
all three needed

(iii) colourless **or** (pale) yellow **[1]**
gas **[1]**

(b) Must have a correct reagent otherwise wc = 0

add chlorine water **or** bubble in chlorine gas **[1]**
yellow **or** orange **or** brown **[1]**
dark brown **or** grey crystals
(**Accept** colour that is darker than for bromide) **[1]**

OR add (acidified) silver nitrate(aq) **[1]**
off white **or** pale yellow **or** cream precipitate **or** soluble in aqueous ammonia **[1]**
yellow precipitate insoluble in aqueous ammonia **[1]**
precipitate essential then either colour **or** solubility in aqueous ammonia

OR add lead nitrate(aq) **[1]**
pale yellow **or** off white **or** cream precipitate **[1]**
yellow precipitate insoluble in aqueous ammonia **[1]**

Accept any test that could work – electrolysis, iron(III) salt
bromine, potassium dichromate, potassium manganate(VII) etc.

(c) $I_2 + 3Cl_2 = 2ICl_3$ **[2]**
For having either reactants **or** products correct ONLY [1]

(d) chlorine **[1]**
COND lower M_r **or** lower density **or** lighter molecules **or** molecules move faster **[2]**

OR lighter **or** based on A_r MAX [1]
smaller with no additional comment **or** sieve idea [0]
N.B. a total of [3] not [2]

TOTAL = 12

2 (a) $Zn + I_2 = Zn^{2+} + 2I^-$ **[2]**
For having either reactants **or** products correct ONLY [1]

(b) for zinc and sodium hydroxide white precipitate **[1]**
dissolves in excess (only if precipitate mentioned) **[1]**

for zinc and ammonia same results **[1]**
Mark either first (sodium hydroxide **or** aqueous ammonia), if completely correct, then an additional [1] can be awarded for stating that the other has the same results.

(c) (i) zinc and a reason **[1]**
Do not mark conseq to iodine in excess

(ii) final mass of zinc bigger **or** the level section higher **or** less zinc used up **[1]**
gradient less steep **or** longer time **or** falls more slowly **[1]**

(iii) steeper gradient **[1]**
same loss of mass of zinc **[1]**

TOTAL = 10

3 (a) (i) CH_3-CH==CH_2 **[1]**

(ii) **conseq** to **(i)**
correct repeat unit **[1]**
COND evidence of continuation **[1]**

(iii) monomer **[1]**
COND because it has a double bond **or** unsaturated **or** alkene **[1]**
NOT addition

(b) (i) to remove fibres **or** remove solid
NOT precipitate, **NOT** impurities, **NOT** to obtain a filtrate **[1]**

(ii) because silver atoms have lost electrons **[1]**
OR oxidation number increased

(iii) silver chloride **[1]**

(c) (i) name of an ester **[1]**
formula of an ester **[1]**
if they do not correspond MAX [1]
Accept name - terylene
for formula ester linkage and continuation
If a 'fat' complete structure must be correct e.g. $C_{17}H_{35}$ etc.
Mark for formula only - [1]

(ii) alcohol **or** alkanol **[1]**
NOT a named alcohol

(d) (i) acid loses a proton **[2]**
base accepts a proton **[1]**

OR same explanation but acid loses a hydrogen ion (1)
and base gains hydrogen ion (1)

(ii) only partially ionised **or** poor hydrogen ion donor **or** poor proton donor **[1]**
NOT does not form many hydrogen ions in water **or** low concentration of hydrogen ions
NOT pH

TOTAL = 15

4 (a) (i) correct word equation (carbon dioxide and water) **[1]**
Accept correct symbol equation

(ii) Must have a correct reagent otherwise wc = 0
add (acidified) barium chloride(aq) **or** nitrate **or** add barium ions **[1]**
COND white precipitate **[1]**
NOT lead(II) compounds

(iii) low pH **or** universal indicator turns red(aq) **[1]**
pH 3 **or** less

(b) (i) $H_2S + 2O_2 = H_2SO_4$ **[2]**
unbalanced [1]

(ii) unpleasant smell **or** it is poisonous **or** when burnt forms acid rain **or** forms sulphur dioxide **or** forms sulphuric acid **[1]**
NOT it is a pollutant

(iii) 2H to 1S
COND 8e around sulphur atom
2e per hydrogen atom
THREE correct **[2]**
TWO from above [1]
Ionic structure = [0]

(c) (i) vanadium oxide **or** vanadium(V) oxide **or** vanadium pentoxide or V_2O_5
Must be correct oxidation state if one given **[1]**

(ii) 400 to 500^{o}C **[1]**

(iii) add to (concentrated) sulphuric acid **NOT** dilute **[1]**
COND (upon sulphuric acid) above then add water **[1]**

(d) mass of one mole of $CaSO_4$ = 136
moles of $CaSO_4$ in 79.1g = 0.58 accept 0.6 **[1]**
moles of H_2O in 20.9 g = 1.16 accept 1.2 **[1]**
conseq x = 2 x given as an integer **[1]**

TOTAL = 16

5 (a) (i) A is glutamic acid **[1]**
B is alanine **[1]**
Accept names only, **NOT** R_f values

(ii) because acids are colourless **or** to make them visible **[1]**
or to show positions of the samples **or** distance travelled

(iii) compare with known acids **or** reference samples **or** standards **[1]**
Accept from colours of samples

(iv) amide linkage **[1]**
COND different monomers **[1]**
continuation **[1]**
Accept hydrocarbon part of chain as boxes
If nylon 6 then only one monomer [1] **NOT** different monomers

(b) correct structure as syllabus (box representation)
correct linkage --O-- **[1]**
continuation **[1]**

(c) **(i)** $C_6H_{12}O_6 = 2C_2H_5OH + 2CO_2$ **[2]**
not balanced [1]
Accept C_2H_6O

(ii) gives out <u>energy</u> **or** equivalent **[1]**
NOT heat
N.B. a total of [1] not [2]

(iii) glucose used up **or** yeast 'killed' by ethanol **[1]**
NOT yeast used up **NOT** reactant used up

(iv) oxidise alcohol to acid **or** to ethanoic acid **[1]**
or to carbon dioxide and water
or if oxygen present aerobic respiration
or cannot have anaerobic respiration in presence of oxygen
NOT it is anaerobic respiration, must be additional comment

(v) <u>fractional distillation</u> **[1]**

TOTAL = 15

6 **(a)** **(i)** bauxite **[1]**

(ii) to reduce melting point **or** improve conductivity **[1]**
or as a solvent **or** reduce the working temperature

(iii) carbon dioxide **or** monoxide **or** fluorine **[1]**

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

(ii) solution goes colourless **or** copper formed **[1]**
or a <u>brown solid</u> forms **or** blue colour disappears
or bubbles
NOT goes clear **or** copper formed

(iii) covered with an <u>oxide layer</u> **[1]**

(c) reaction no reaction **[1]**
reaction reaction **[1]**

(d) **(i)** $2Al(OH)_3 = Al_2O_3 + 3H_2O$ **[2]**
Not balanced [1]

(ii) Aluminium nitrate = aluminium oxide + nitrogen dioxide + oxygen **[2]**
only TWO correct products [1]

TOTAL = 12