CAMBRIDGE
INTERNATIONAL EXAMINATIONS

November 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0620/03

CHEMISTRY
Extended

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

- An incorrectly written symbol, e.g.NA **or** CL, should be penalised once in a question.

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) (i) different boiling points [1]

(ii) methane **or** water **or** petroleum **or** named petroleum fraction **or** alkane
Any TWO [2]

(b) (i) volume decrease for forward reaction **or** fewer moles of gas on products side [1]
favoured by increase in pressure [1]
or increase in pressure moves position of equilibrium to right

(ii) increase [1]
exothermic reaction favoured by lower temperature [1]

(iii) 300 to 600 ^{0}C
1:3 volume ratio
iron (catalyst)
150 to 300 atm
Any TWO [2]

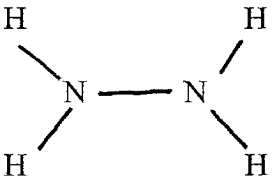
(c) (i) proton [2]
hydrogen ion **or** H^+ **ONLY** [1]

(ii) correct equation molecular **or** ionic [1]
$NH_3 + HCl = NH_4Cl$
$NH_3 + H^+ = NH_4^+$ accept NH_4OH

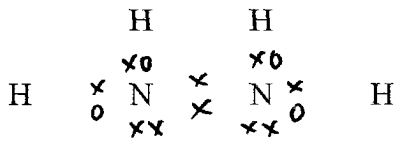
(d) measure pH **or** add universal indicator **or** pH meter [1]
ammonia has lower pH if numerical values given

must be appropriate that is above 7 with ammonia having the lower value **or** correct colours, green and blue are acceptable [1]
OR measure conductivity [1]
ammonia has poorer conductivity [1]

(e) (i) correct structural formula [1]



(ii) 8e around nitrogen [1]
2e around each hydrogen [1]



TOTAL = 17

2 (a) (i) 40 [1]
80 **or** 40 [1]
1 [1]

(ii) particles have more energy **or** moving faster [1]
collide more frequently
or collide with more energy [1]

(iii) greater surface area [1]

(iv) flour mills **or** coal mines **or** metal powders [1]
or fireworks **or** gunpowder

(b) (i) collect and measure volume of oxygen [1]
or mass **or** count bubbles
time [1]

(ii) measure rate in different light levels and comment [1]
accept if dark no reaction

(c) (i) $+6O_2$ [2]
not balanced that is just O_2 **ONLY** [1]

(ii) linkage ---O---- [1]
chain [1]
minimum to be accepted

TOTAL = 14

3 (a) (i) heat **or** roast [1]
in air [1]

(ii) Either correct equation [2]
$ZnO + C = Zn + CO$
$2ZnO + C = 2Zn + CO_2$
Not balanced **ONLY** [1]
NOT carbon monoxide as a reductant

(iii) bp of lead above 1400 ^{0}C it remains
bp of zinc below 1400 ^{0}C
boils away **or** forms vapour
Any TWO [2]

OR lead does not boil [1]
zinc boils [1]

(b) (i) making brass **or** any zinc containing alloy **or** galvanising [1]
or sacrificial protection **or** batteries **or** roofs

(ii) lattice **or** layers of (positive) ions
delocalised **or** free **or** mobile electrons
layers/atoms/particles can slip [3]

(iii) different size atom **NOT** shape [1]
prevents layers from moving [1]

(c) (i) one involving lead – change 2 [1]
cond because electrons are gained [1]
or oxidation number less

(ii) correct equation [2]
$Zn + 2Ag^+ = 2Ag + Zn^{2+}$
not balanced **ONLY** [1]

TOTAL = 16

4 (a) (i) in which something dissolves [1]

(ii) correct formula [1]
$CH_3COOC_2H_5$ **or** full structural formula

NOT $C_4H_8O_2$

(iii) steam **or** water **or** hydration [1]
heat **or** catalyst [1]

OR bubble into (concentrated) sulphuric acid [1]
add water [1]

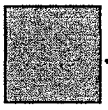
oxidised [1]
by air **or** dichromate **or** manganate(VII) [1]

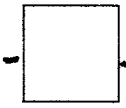
(iv) ethanoic acid and butanol [1]

(b) (i) CH_2OH [1]
CHOH
CH_2OH

(ii) soap **or** detergent [1]

(c) (i) polyester **or** condensation polymer **NOT** terylene [1]

(ii) HOOC –  –COOH [1]

HO –  – OH [1]

If wrong way around [1] Point of attachment of functional group to "box" not important

(d) (i) protein **or** poly peptide **or** polyamide [1]
(ii) peptide **or** amide [1]
(iii) amino acids are colourless **or** become visible/coloured **or** to develop it [1]
(iv) using colour **or** from position **ONLY** [1]
OR discussion of Rf [2]
OR compare with known amino acids [2]

TOTAL = 17

5 (a) (i) preserve food **or** sterilising [1]
(ii) making paper [1]

(b) (i) making sulphuric acid **or** Contact Process [1]

(ii) oxygen [1]

(iii) vanadium oxide as catalyst (ignore oxidation state)
400 to 500 °C
pressure less than 10 atm
Any TWO [2]

(c) (i) pink **or** purple [1]
colourless **NOT** clear [1]

(ii) barium sulphate [1]
cond bromine oxidises **or** reacts with [1]
sulphur dioxide to form sulphate ion [1]

(d) the number of moles of SO_2 in the mixture = 0.125
the number of moles of Cl_2 in the mixture = 0.2
cond reagent was not in excess? SO_2
cond moles of SO_2Cl_2 formed = 0.125
cond the mass of sulphuryl chloride formed = 16.9g
[5]

TOTAL = 16

TOTAL for PAPER = 80