UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0620 CHEMISTRY

0620/23 Paper 2 (Core Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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

CIE is publishing the mark schemes for the October/November 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** magnesium oxide / MgO [1]

(b) nitrogen dioxide / NO_2;
ALLOW nitrogen oxide [1]
sulfur dioxide / SO_2
ALLOW sulfur oxide [1]

(c) carbon dioxide / CO_2; [1]
water / H_2O [1]

(d) water / H_2O [1]

(e) carbon dioxide / CO_2 [1]

[Total: 7]

2 **(a)** **(i)** substance containing two (or more) different atoms / elements joined / combined / bonded
BOTH idea of different atoms / elements and bonded needed for 1 mark [1]

(ii) (compound) B; [1]
it is an ionic giant structure / it is ionic [1]
ALLOW it contains ions

(iii) C [1]

(b) **(i)** 1st box ticked (conducts when molten) [1]

(ii) add (aqueous) silver nitrate; [1]
(light) yellow precipitate (BOTH yellow and precipitate required) [1]
2nd mark dependent on correct reagent
NOT cream precipitate
ALLOW lead nitrate (1) yellow precipitate (1)

(c) it is an oxide of a non-metal / iodine is a non-metal [1]

[Total: 8]

3 (a) (i) allow between 720 and 820°C (actual = 760 °C) [1]

(ii) caesium; [1]
rubidium [1]
apply listing rules for more than 2 elements

(iii) increases (down the group) [1]

(b) soft; [1]
melting; [1]
increases [1]

(c) sodium + water → sodium hydroxide + hydrogen [2]
–1 per omission or error
ALLOW = instead of →
IGNORE: reference to states
NOT: plus instead of +
NOT: + energy

(d) (i) 2 on left;
2 on right [2]
–1 per omission / error

(ii) has two atoms (in its molecule) [1]
NOT reference to elements / two atoms the same / a compound of two atoms

(iii) arrangement: random / not ordered / disordered [1]
ALLOW: far apart together;
motion: random / (moving) fast / rapid / everywhere / move with ease / freely [1]
IGNORE: loosely packed

(iv) pair of bonding electrons; [1]
8 electrons in outer shell of each chlorine [1]
separate atoms = 0
IGNORE: inner electrons

[Total: 16]

4 (a) (i) covalent [1]

(ii) C [1]

(iii) B [1]

(iv) ethanol [1]

(v) bromine water
ALLOW: bromine / potassium permanganate; [1]
turns colourless [1]
IGNORE: colour of bromine

(b) (i) any two of:
same functional group /
same general formula /
similar chemical properties /
gradual change in physical properties [2]
ALLOW: (successive members) differ by a CH_2 group

(ii) correct formula (molecular or displayed) for any alkane apart from ethane [1]
correct name corresponding to the formula [1]

(c) (i) X placed inside the column at the top [1]

(ii) B placed by bottom arrow [1]

[Total: 12]

5 (a) (i) decreases / gets smaller [1]
NOT disappears / increases in surface area

(ii) increases [1]

(b) (i) points plotted correctly including 0,0 [2]
(–1 per incorrect or no point plotted)
curve of best fit drawn [1]
(max 1 mark if graph plotted wrong way round)

(ii) 44 cm^3 [1]
ALLOW: 44 / correct reading from incorrect curve in part **(i)**
NOT: incorrect units

(iii) all the zinc had been used up / one of the reagents used up [1]
ALLOW: the reaction has finished
NOT: sulfuric acid used up

(iv) lighted splint; [1]
(gas) pops / explodes / blows out flame [1]
IGNORE: pop test

(c) (i) goes faster / more hydrogen given off per minute / more gas given off per unit time / less time for same amount of gas [1]

(ii) goes slower / less hydrogen given off per minute / less gas given off per unit time / more time for same amount of gas [1]

(d) substance which speeds up a reaction [1]
ALLOW: changes the rate of reaction

[Total: 12]

6 **(a)** Any three of:
high boiling point or high melting point /
high density /
form coloured compounds or have coloured ions
form ions of more than one charge or variable valency /
form complex ions /
ALLOW: (very) hard / hardness / (good) catalysts [3]

(b) **(i)** different number of neutrons / different nucleon number [1]

(ii) 57 [1]

(iii) 26 [1]

(c) **(i)** water / damp / humidity; [1]
IGNORE: a little or similar when referring to damp / water
air / oxygen [1]

(ii) suitable method e.g. coating with zinc / coating with unreactive metal / plastic / oil (or grease) / galvanising / sacrificial protection
NOT: removing air / water [1]
suitable reason e.g. stops air / water reaching surface [1]
(reason must be consequential to the method chosen)

(d) iron oxide; [1]
it loses oxygen / gains electrons / iron decreases oxidation number
IGNORE: wrong oxidation numbers
NOT addition of hydrogen [1]

(e) **(i)** by (incomplete) combustion of hydrocarbons / carbon compounds [1]
ALLOW: (incomplete) combustion of fossil fuels / named carbon containing fuel / carbon (or hydrocarbons etc) react with air (or oxygen)
NOT: reacts with air unqualified (must refer to a carbon compound / fossil fuel)

(ii) poisonous / toxic / kills you / suffocates you / stops red blood cells carrying oxygen [1]
ALLOW: binds with haemoglobin in place of oxygen
NOT: harmful

[Total: 14]

7 (a) (i) (boric acid) had dissolved [1]
ALLOW acid had diffused / an acid is formed here
IGNORE: boric acid is acidic / neutralisation / it is an acid

(ii) pH 8 [1]

(iii) random movement of particles / mixing up of particles [1]
ALLOW: bulk / overall movement of particles from high to low concentration
IGNORE: particles move from high to low concentration

(iv) idea of neutralisation (of acid by alkali) [1]
IGNORE: returned to neutral

(b) (i) CON_2H_4 [1]
ALLOW: any order of atoms / $(NH_2)_2CO$

(ii) 60 [1]

(c) (i) nitrogen [1]
IGNORE: nitrates

(ii) to increase crop / plant growth / speeds up plant growth; [1]
to put back nitrogen (or nutrients) into the soil / to provide plants with (more) nutrients
ALLOW: to supply plants with nitrogen / essential elements [1]
IGNORE: makes the soil more fertile / to supply nitrogen gas / N_2

(d) Any two of:
evaporate some of the water / heat to crystallisation point / heat a little / partially evaporate;
NOT heat or evaporate without qualification

allow to crystallise / leave in a warm place / leave on the window sill;
IGNORE: cool it

dry with filter paper [2]
NOT: dry in oven unless it implies that the temperature is below 100 °C / very low

[Total: 11]