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

0620/22 Paper 2 (Core Theory), maximum raw mark 80

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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]