

**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.

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- 1 (a) magnesium oxide / MgO [1]
- (b) nitrogen dioxide / NO<sub>2</sub>; [1]  
ALLOW nitrogen oxide  
sulfur dioxide / SO<sub>2</sub> [1]  
ALLOW sulfur oxide
- (c) carbon dioxide / CO<sub>2</sub>; [1]  
water / H<sub>2</sub>O [1]
- (d) water / H<sub>2</sub>O [1]
- (e) carbon dioxide / CO<sub>2</sub> [1]

**[Total: 7]**

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

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- 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]**

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- 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<sub>2</sub> 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]**

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- 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<sup>3</sup> [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]**

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- 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]**

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- 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)  $\text{CON}_2\text{H}_4$  [1]  
ALLOW: any order of atoms /  $(\text{NH}_2)_2\text{CO}$
- (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 /  $\text{N}_2$
- (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  $100^\circ\text{C}$  / very low

**[Total: 11]**