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### Mark Scheme: Teachers' version

#### Syllabus Paper

**IGCSE – October/November 2010**

| Paper | 0620 | 23 |

1. **(a)** magnesium oxide / MgO
   
   **(b)** nitrogen dioxide / NO₂;
   
   ALLOW nitrogen oxide
   
   sulfur dioxide / SO₂
   
   ALLOW sulfur oxide
   
   **(c)** carbon dioxide / CO₂;
   
   water / H₂O
   
   **(d)** water / H₂O
   
   **(e)** carbon dioxide / CO₂
   
   **[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

   **(ii)** (compound) B;

   it is an ionic giant structure / it is ionic
   
   ALLOW it contains ions

   **(iii)** C

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

   **(ii)** add (aqueous) silver nitrate;

   (light) yellow precipitate (BOTH yellow and precipitate required)

   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

   **[Total: 8]**
3  (a) (i)  allow between 720 and 820°C (actual = 760°C)  
(ii)  caesium;  rubidium  
apply listing rules for more than 2 elements  
(iii)  increases (down the group)  

(b)  soft;  
melting;  
increases  

(c)  sodium + water → sodium hydroxide + hydrogen  
−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  
−1 per omission / error  
(ii)  has two atoms (in its molecule)  
NOT reference to elements / two atoms the same / a compound of two atoms  
(iii)  arrangement: random / not ordered / disordered  
ALLOW: far apart together;  
motion: random / (moving) fast / rapid / everywhere / move with ease / freely  
IGNORE: loosely packed  
(iv)  pair of bonding electrons;  
8 electrons in outer shell of each chlorine  
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 CH₂ 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
   NOT disappears / increases in surface area [1]

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

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

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

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

(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
   ALLOW: changes the rate of reaction [1]

[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;
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
suitable reason e.g. stops air / water reaching surface
(reason must be consequential to the method chosen) [1]

(d) iron oxide;
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 [1]

[Total: 14]
7 (a) (i) (boric acid) had dissolved
ALLOW acid had diffused / an acid is formed here
IGNORE: boric acid is acidic / neutralisation / it is an acid

(ii) pH 8

(iii) random movement of particles / mixing up of particles
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)
IGNORE: returned to neutral

(b) (i) CON₂H₄
ALLOW: any order of atoms / (NH₂)₂CO

(ii) 60

(c) (i) nitrogen
IGNORE: nitrates

(ii) to increase crop / plant growth / speeds up plant growth;
to put back nitrogen (or nutrients) into the soil / to provide plants with (more) nutrients
ALLOW: to supply plants with nitrogen / essential elements
IGNORE: makes the soil more fertile / to supply nitrogen gas / N₂

(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
NOT: dry in oven unless it implies that the temperature is below 100°C / very low

[Total: 11]