**MARKING SCHEME**

**CHEMISTRY**

**Paper 1**

**MARCH/APRIL 2023**

1. (a) X 2.8.1 √½

Y 2.8.2 √½

W 2.8.5 √½

(b) W Y X √½

Atomic radius decrease with increase in number of protons √1 /nuclear charge

1. (a) When the air hole is open √1

(b) Slip a white manila paper or wooden splint √½ and quickly √½ remove before it catches fire. The middle part burns uniformly. √1

Accept the diagram which is well labeled.

1. (a) Property Nacl Alcl3

Bond ionic √½ covalent √½

Structure giant ionic √½ molecular √½

(b) There is effervescence √½ Aluminium chloride hydrolyses in water forming acidic solution. √½

1. (a) Molten magnesium chloride has mobile ions √½ while sugar solution has molecules √½ /lack mobile ions.

(b)

|  |  |  |
| --- | --- | --- |
|  | Anode | Cathode |
| Observations | Green-yellow gas | Grey solid |
| Half-equations | 2Cl Cl2(g) + 2e | Pb2+(l) + 2e Pb(s) |

Penalize ½ for missing or wrong stare symbols.

1. (a) Ammonia gas/NH3(g) √1

(b) White precipitate formed that dissolves in excess. √1

Ammonia gas dissolves in aqueous solution to form ammonium hydroxide √½ which react with zinc ions forming zinc hydroxide √½ that dissolves in excess to form tetra ammine zinc (II) ion.

1. √1

= 55.9 √1

No units

Penalize fully when units are shown.

1. (a) The volume of a fixed mass of a gas is directly proportional to its absolute temperature at constant pressure. √1

(b) Increase in volume reduces the number √1. Collisions of gas molecules and the walls of the container causing a decrease in pressure. √1

1. (a) Sodium ethanoate √1/CH3 COONa

(b) (i) Ultra-violet light /sunlight.√1

(ii) CH4(g) + 4Cl2(g) CCl4(g) + 4Hcl(g)√1

1. (a) Test (i) SO, SO and CO √1 present. at least two

Test (iii) A13+ √1 only penalize Pb2+

(b) A13+  √½ penalize Pb2+

SO √½

1. Potassium hydroxide is a strong base √½ and dissociate /ionizes fully √½ giving more OH- ion √½

Ammonia is a weak base √½ hence ionizes partially in water.

1. (a) Iron (II) sulphide

Dilute hydrochloric acid *mark as a pair for 1 mark.*

NB: Any sulphide and dilute acid.

(b) Hydrogen sulphide

Acidified potassium manganite (VII) is decoloured √½ and yellow deposit. √1

Sulphur (IV) oxide

Acidified potassium manganite (VII) is decolourised. √½

1. Mass of carbon in CO2 = x 5.28 = 1.44g √½

Mass of hydrogen in H2O = x 1.62 = 0.188 √½

Mass of oxygen = 2.58g – (1.44 + 0.18) = 0.96g √½

|  |  |  |
| --- | --- | --- |
| C | H | O |
| 2 | 3 | √½  √½  1 |

C2 H3 O1 √½

1. (a) Calcium oxide √1 Reject any other

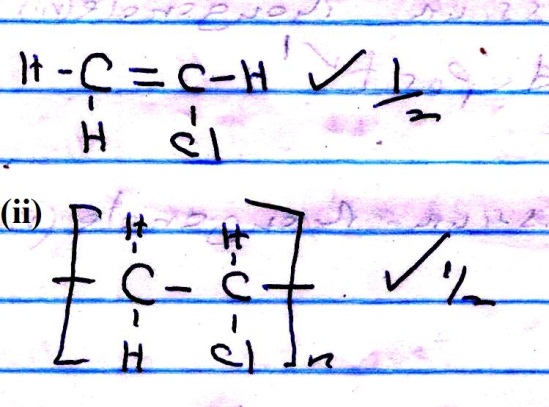
(b) (i) Black Copper (II) oxide changes to brown copper metal √1

(ii) Reducing agent √1

1. (a) Water √1

(b) Ethane √1

(c) (i)

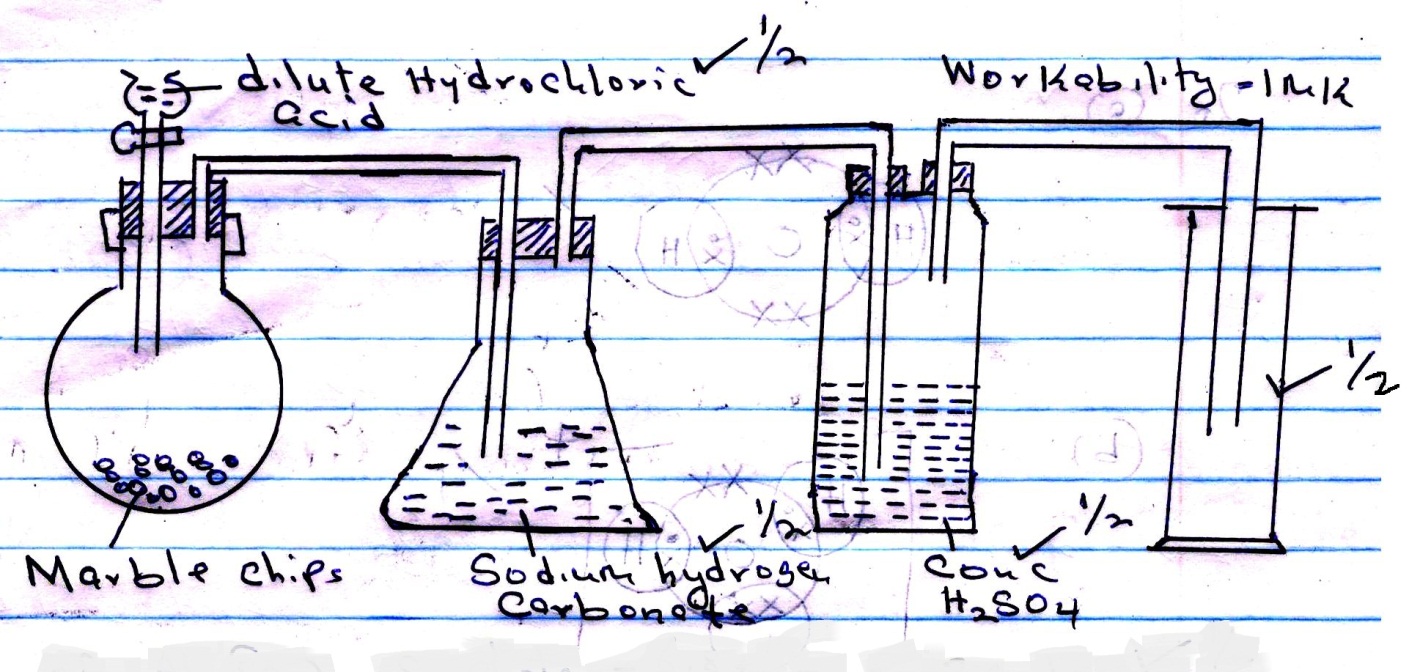


1. Drop a piece of sodium metal in distilled water √1 in a beaker, to the resulting solution add dilute nitric (IV) acid. √½ Evaporate √½ the resulting mixture to saturation and cool √½ for crystals to form, dry √½ crystals between filter papers.
2. (a) (i) Cold √½ and dilute √½ sodium hydroxide.

(ii) Sodium hypochlorite (NaOCl) dissociates √½ giving out nascent oxygen √½ to the dye causing it to bleach.

(b) Introduce a glass rod dipped in concentrated ammonia solution, √½ white fumes formed. √½





1. Moles of Al2 (SO4)3 sulphate = = 0.02 moles √½

Molarity = = 0.05m √½

Al2 (SO4)3(a) 2 Al + 3 SO4 √½

Molarity of SO = 0.05 x 3 = 0.15m √½

Number of SO = 0.15 x 6.0 x 1023 √½

= 9.0 x 1022 ions √½

Accept alternative method

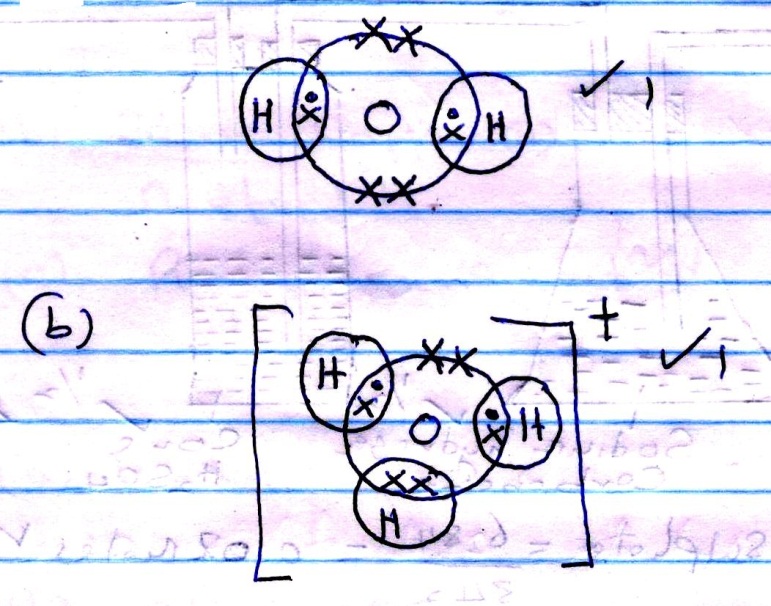
1. Burning magnesium √

Continues to burn, √½ a mixture of white solid and black specks formed. √½ Heat √½ produced decomposes carbon (IV) oxide to carbon and oxygen. √½

Burning splint

It extinguished/put off √½ carbon (IV) oxide does not support combustion. √½

1. (a)



(c) Water molecule has lone pair of electrons which it can dissolve to H+ √1

1. Heat zinc sulphate to saturation √½ and allow saturated solution to cool √½ for crystals to form.
2. 2 C2H6(g) + 5 O2(g) 4 CO2(g) + 6 H2O(l) √1

Volume of Ethane burned = = 16cm3 √½

Volume of ethane remaining = 120 – 16 = 104cm3√½

Volume of carbon (IV) oxide formed = = 32cm3

1. Brown fumes evolved, √1 carbon reduces nitric (V) acid to Nitrogen (IV) oxide √½ and water and carbon is oxidized to carbon (IV) oxide √½
2. (a) Mg(H CO3)2 √½

Ca (HCO3)2 √½

(b) Contain calcium ions √1 required in bone formation and strengthening of teeth/ improve taste.

(c) Mg(H CO3)2(aq) Mg CO3(s) + CO2(g) + H2O(l)

Or

Ca (HCO3)2(aq) COCO3(s) + CO2(g) + H2O(l)

Penalize ½ mark for missing or wrong symbol.

1. (i) No effervescence /No bubbles √½

Hydrogen chloride gas in methylbenzene is not ionized. √½

(ii) Effervescence/ Bubbles of gas √½

Hydrogen chloride gas in methylbenzene ionizes and it is acidic. √½

1. (a) It is the heat change when one mole of a substance dissolves in water to form infinitely dilute solution / very dilute. √1

(b) Heat change = x 4.2 kJ/Kg/K x 7 √½

= 1.47KJ √½

Moles of copper (II) sulphate = √½

= 0.01 moles √½

Molar heat of displacement of Copper (II) ions

√½ = -147 KJ/mole√½

* ΔH(-) sign must be shown and units must be correct.
* Penalize fully if missing.

1. (a) Vanadium (V) oxide √1 or

Platinum

(b) Reaction between Sulphur (VI) oxide and water is highly exothermic √1 and hence boil the acid

1. (a) Heat absorbed is used to weaken the forces √1 of attraction between the particles resulting in change of state.

Accept intermolecular forces.

(b) (i) Latent heat of vaporization √½

(ii) It is negative √1

1. Mass of saturated solution = (26.8g – 15.86g)

= 10.94g √½

Mass of a solute = (16.86 – 15.86)g

= 1g √½

Mass of solvent = 10.94g – 1g = 9.94g √½

If 1g 9.94g of water

? 60g of water

= = 6.03g √½

Mass of saturated solution = (60 + 6.03)g √½ = 66.03g √½