**MARKING SCHEME CHEMISTRY PAPER 233/1**

**1.(a)**By passing through filters/electrostatic precipitators✓

**(b)** Carbon (IV) oxide would otherwise solidify and block the pipes✓

**2.** Add✓ ½ water to the mixture stir ✓ ½ the mixture for all Sodium Carbonate to dissolve. Filter ✓ ½ the mixture to obtain calcium carbonate as residue and sodium carbonate as filtrate.

Heat ✓ ½ the filtrate to evaporate ✓ ½ excess water and leave it to cool slowly for sodium carbonate to crystallize ✓ ½ . Finally filter the product and obtain pure crystals of sodium carbonate.

**3. (i)** Method of gas collection is wrong,gas is lighter than air

**(ii)** $Zn(s) + 2HCl(aq) \longrightarrow ZnCl_2(aq) + H_2(g)$

**(iii)** It burns with a pop sound when ignited

**4. Air contains carbon (IV)oxide ;1mk this gas reacts with water to form carbonic acid hence pH drops to 6.0;1mk**

**5. Iron III chloride is molecular and methylbenzene is also molecular while magnesium II chloride is an ionic compound**

**6.** Dissolve **(✓ ½)** Lead carbonate in dilute Nitric acid **(✓ ½ )** React the mixture with dilute Hydrochloric acid (1) Filter **(✓ ½ );** to get Lead (II) Chloride **(✓ ½ )**

**7.** $75cm^3$ of $CO_2$ takes = $\frac{75 \times 15}{60}$ second ✓ ½ = 22.5 seconds✓½

Rmm of $CO_2 = 12 + 2 \times 16 = 44$ ✓ ½

Rmm of $NO_2 = 14 + 2 \times 16 = 46$ ✓ ½

$$\frac{TNO_2}{TCO_2} = \sqrt{\frac{MNO_2}{MCO_2}}$$

$TNO_2 = 22.5\sqrt{\frac{46}{44}}$ seconds ✓ ½

= 23.006s ✓ ½

**8.(a)** $Ca(OH)_{2\,(aq)} + CO_{2(s)} \longrightarrow CaCO_{3(s)} + H_2O_{(l)}$ ✓ ½

Lime water forms white ✓ ½ ppt due to the formation of calcium carbonate but in excess calcium carbonate forms colourless solution due to the formation of soluble ✓ ½ calcium hydrogen carbonate.

$CaCO_{3(s)} + H_2O_{(l)} + CO_{2\,(g)} \longrightarrow Ca(HCO_3)_{2(aq)}$ (2 mks)

**(b).**In diamond each carbon atom is bonded to four other carbon atoms ✓ ½ arranged in a regular tetrahedron shape the whole structure of diamond extends all directions forming a rigid ✓ ½ mass of atoms. (1 mk)

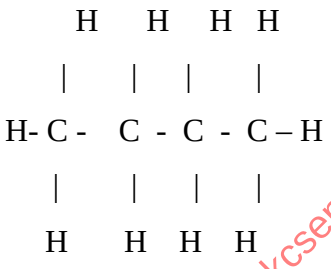
**9.** (i)D

(ii)A

(iii)B

(iv)C

**10. (i)**



**(ii)** acidified potassium chromate (VI) changes from orange to green✓ 1

**11.(a)** Sulphur(iv)oxide✓ **1**

**(b)** $Na_2SO_3$ (s) $+2HCl(aq) \longrightarrow SO_2(g) + 2NaCl(aq) + H_2O(l)$ ✓ 1

**(c)** the red litmus paper is bleached✓ 1

**(d) brown iron( III) ions changes to green due to reduction of iron (III) ions to iron (II) by hydrogen sulphide**

**12.Two aluminium chloride molecules join to form a diametric molecule;1mk.the diametric molecules are held together by weak van der waals forces which easily break when heated;1mk hence the solid sublimes**

**13.(a)**It is the maximum mass of solute that dissolves in 100g of water to form a saturated

solution at aparticular temperature.

**(b)** it is agas

**(c)** the solution becomes more saturated with the gas

**14.(a).(**i) $Cu^{2+}$ , $Al^{3+}$

(ii) $SO_4^{2-}$

**(b)** Al3+(aq) + 3OH- Al(OH)3(s)

**15. (i)** fractional distillation

**(ii)** N-add water

P- addition of hydrogen

**16.(i)** Soap. 1mk

**(ii)** Concentrated NaCl/ Brine/ $NaCl_{(l)}$ **1**

**(iii)** To precipitate out the soap **1**

**17.(a) sodium**

**Potassium**

**(b)silver**

**Mercury**

**(c) 2Ca(NO3)2 → 2CaO+4NO2+O2**

**18.(i) increases;1/2mk because it combines with oxygen to form the solid copper (II) oxide;1mk**

**(ii) Reduces;1/2mk because it combines with oxygen to form the gaseous sulphur( IV) oxide;1/2mk which escapes;1/2mk**

**19.(I)it is the minimum amount of energy required to remove an electron from the outermost energy level of an atom in its gaseous state**

**(ii)C because it requires a lot**

**20.(i)** Hydrogenchloride

**(ii)** it prevents sucking back/increases surface area for dissolving

**(iii)** the $p^H$ of the water drops

**21.(i)**U- Nitrogen(I)oxide

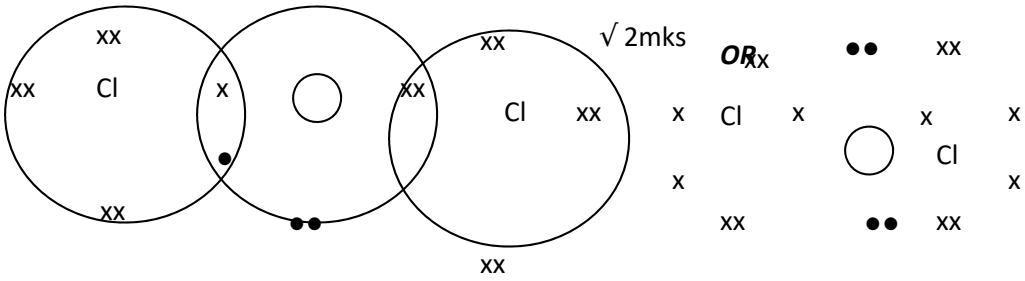
W- Nitrogen(iv)oxide

**(ii)** F-ammonium sulphate ✔

V-ammonium nitrate ✔

**(iii)** $NH_3(g) + H_2SO_4(g) \longrightarrow (NH_4)_2SO_4$ ✔

**22. (a)**




**(b)** It forms a molecular structure with weak vander waals forces that are easily broken √ ½

23. $C_2H_{4(g)} + 3O_{2(g)} \longrightarrow 2CO_{2(g)} + 2H_2O_{(g)}$

1 Mol 3 Mol : 2 Mole ($^1/_2$ mks) ✔

1 Mole: 3 Vol.:2 Vol. ✔

$15cm^3$ :$45cm^3$ :$30\ cm^3$

Total residual gas mixture

= $5cm^3$ of excess oxygen + $30\ cm^3$ of $Co_2$

Total = $35cm^3$ ✔ **($^1/_2$ mks)**

**24.(a)** volume is inversely proportional to pressure ✔

**(b)** $P_1V_1 = P_2V_2$

$3 \times 1 = 2 \times V_2$ ✔

$V_2$ =1.5litres ✔

**25.(a)** it is water that contains dissolved calcium and magnesium ions and does not lather easily

**(b)** $Ca(HCO_3)(aq) \longrightarrow CaCO_3(s) + CO_2(g) + H_2O(l)$ ✔

**(c)** –contains calcium ions required for strong teeth ✔

-used for brewing

-used for leather tanning

**26.(a)** to generate steam that reacts with zinc metal and also drive away air from the apparatus

**(b)** zinc glows and a yellow solid is seen ✔

**27.(i)** $2PbS(s) + 3O_2(g) \longrightarrow 2PbO(s) + 2SO_2(g)$

**(ii)** Carbon(iv)oxide ✔

**(iii)** making lead pipes, making lead acid batteries ✔

**28.(a)** $(CH_2)n = 42$

$(12 + 2)n = 42$

$14n = 42$

$n = 3$ √ ½

MF = $3(CH_2)$ $C_3H_6$ √ ½

**(b)** $CnH_2n$ √ 1

**(c)** But-1-ene/ √ ½/ Butene