

1. a) $A^{1/2}mk$ and $G^{1/2}mk$ 1mk
The ionic radius is larger 1 mk than the atomic radius implying they gain electrons.
- b) JA_2 1mk
Metallic(1mk)
- c) The oxide of E is ionic 1mk with a giant ionic structure that requires a lot of energy to break the oxide of G is molecular.(2mks)
- d) i. A and D 1mk
A is a non-metal with the smallest $\frac{1}{2}mk$ atomic radius hence most electronegative
D is a metal with the smallest atomic radius hence most electropositive. $\frac{1}{2}mk$
- ii. E . 1mk Has high melting point $\frac{1}{2}mk$ and good $\frac{1}{2}mk$ conductor of heat being a metal .
- e) i. R gains 2es and hence there is less nuclear 1mk charge /attraction than its atom/gains 2es nuclear attracts 20es against 16 electrons in the atom.
- ii. $Q_{(s)} + R_{(s)} \longrightarrow QR_{(s)}$ 1mk
2. a) i. P and Q (2mks)
- ii. L-Baseline (1mk)
M- Solvent front (1mk)
- iii) Most sticky/less soluble(1mk)
- b) i. B(1mk)
Flame B burns completely because its very hot but A has unburnt region hence it contains unburnt region.91mk)
- c) i. Sodium hydroxide solution absorbs carbon (IV) oxide gas(1mk)
- ii. Nitrogen gas. Because it has the lowest boiling points.(2mks)
- iii.-Used in oxyacetylene flame.
- Burning fuels for propelling rockets.
- To remove iron impurities during steel making. Any 2 – 1mk
3. a) i. $Zn(OH)_{2(g)}$ (1mk)
- ii. $ZnCl_{2(aq)}$ (1mk)
- iii. $ZnO_{(s)}$ (1mk)
- b) $2Cl^-_{(aq)} + Pb^{2+}_{(aq)}$ (1mk)
- c) White ppt formed (1mk)
Dissolve in excess (1mk)
- d) i. I Z (1mk)
II Y (1mk)
- ii. Amphoteric (1mk)

iii. Zn (OH)_{2(s)} / zinc hydroxide. (1mk)

4. a) A-Ethane C₂H₄ CH₂=CH₂

B- Ethane C₂H₆ CH₃ CH₃

F – Carbon (IV) oxide CO₂

G- Hydrogen H₂ (4mks)

b)i) C₂H_(g) + Br_{2(l)} → C₂H₄Br₂ or CH₂Br - CH₂Br (1mk)

ii) 2C₂H_{6(g)} + 7O_{2(s)} → 4CO_{2(g)} + 6H₂O_(g)
If not balanced = 0mk
Wrong or missing symbols = 1/2mk

iii) 2Na_(s) + 2H₂O_(l) → 2NaOH_{aq} + H_{2(g)} (2mks)
Balanced = 2mks
Not balanced = 0mk.

c) Mass of monomer = 2(12 + 2) = 28
No. of molecules = $\frac{42000}{28}$ = 15000 molecules (2mks)

d) i.. Temperature of 180 °C (1mk)

ii. Nickel catalyst (1mk)

5. a) i.- scale(I)

-Plotting all points correctly (I)

- Curve (shape)

ii. 0.188 - 0.12 = 0.068 mol(I)

Therefore mass of hydrated copper(II) sulphate
= 0.68 x 250 = 17g

b)i. Moles of AgNO₃ = $\frac{0.1 \times 24.1}{1000}$ = 2.41 x 10⁻³

ii. Moles of NaCl = Moles of AgNO₃
= 241 x 10⁻³

iii. Moles of NaCl in 250cm³ = 2.41 x 10⁻³ x $\frac{250}{25}$

$$=2.41 \times 10^{-2}$$

$$\text{iv. R.F.M NaCl} = 23 + 35.5 = 58.5$$

$$\begin{aligned} \text{Mass of NaCl in } 5\text{cm}^3 &= 2.41 \times 10^{-2} \times 58.5 \\ &= 1.41\text{g} \end{aligned}$$

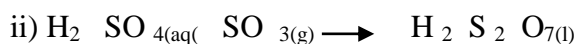
$$\begin{aligned} \text{v. Mass of water} &= 5.35 - 1.41 \\ &= 3.94\text{g} \end{aligned}$$

vi. 3.94 g of water contains 1.41 g of NaCl

$$\begin{aligned} 100 \text{ g of water} &= \frac{1.41 \times 100}{3.94} \\ &= 35.7 \end{aligned}$$

6. a). Contact process = 1mk

b). i) Sulphuric(IV) acid. (1mk)



c). i. Platinized asbestos (1mk)

ii. - It is not highly poisoned (2mks)
- It is cheap

d) Crystals turn blue to white. Concentrated sulphuric(IV) acid removes water of crystals from hydrated copper(II) sulphate. (2mks)

e) Concentrated sulphuric (VI) acid is less volatile hence displaces more volatile acids from their salts. (1mk)

f) Used in; - accumulators.
- in manufacture of fertilizers.
- in etching of metals.
- in manufacture of detergents. (any 2mks)

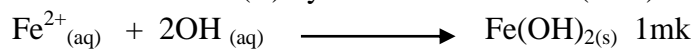
7. a) i. Hydrogen chloride gas ($\text{HCl}_{(\text{g})}$) 1mk

ii. Water ($\text{H}_2\text{O}_{(\text{l})}$) 1mk

b).....

c) i. Green ppt (1mk)

ii. Insoluble iron (II) hydroxide was formed (1mk)



$$\begin{aligned} \text{d) Mass of } 1000\text{cm}^3 \text{ of solution} &= 1000 \times 1.18 \quad \frac{1}{2}\text{mk} \\ &= 1180\text{g} \quad \frac{1}{2}\text{mk} \end{aligned}$$

$$\begin{aligned} \text{Mass of HCl} &= \frac{35}{100} \times 1180 \quad \frac{1}{2}\text{mk} \\ &= 413\text{g} \quad \frac{1}{2}\text{mk} \end{aligned}$$

$$\begin{aligned} \text{Molarity} &= \frac{413}{36.5} \quad \frac{1}{2}\text{mk} \\ &= 11.3151\text{ M} \quad \frac{1}{2}\text{mk} \end{aligned}$$