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 ionic1mk 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 ½mk atomic radius hence most electronegative
   D is a metal with the smallest atomic radius hence most electropositive. ½mk
   ii.E . 1mk Has high melting point ½mk and good ½mk 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 impunities during steel making. Any 2 – 1mk
3. a) i. $Zn(OH)_{2(g)}$ (1mk)

   ii. $Zn\,CL_{2(aq)}$ (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 C_2H_4 $CH_2=CH_2$

B- Ethane C_2H_6 CH_3 CH_3

F – Carbon (IV) oxide CO_2

G- Hydrogen H_2 (4mks)

b)i) $C_2H_{(g)} + Br_{2(l)} \longrightarrow C_2H_4Br_2$ or $CH_2Br - CH_2Br$ (1mk)

ii) $2C_2H_{6(g)} + 7O_{2(s)} \longrightarrow 4CO_{2(g)} + 6H_2O_{(g)}$

If not balanced = 0mk

Wrong or missing symbols = $^1/_2$mk

iii) $2Na_{(s)} + 2H_2O_{(l)} \longrightarrow 2NaOH_{9aq)} + H_{2(g)}$ (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 180^0 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 $AgNO_3 = \frac{0.1 \times 24.1}{1000} = 2.41\ 10^{-3}$

ii.Moles of NaCI = Moles of $AgNO_3$

$= 241 \times 10^{-3}$

iii.Moles of NaCL in $250cm^3 = 2.41 \times 10^{-3} \times \frac{250}{25}$

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

iv.R.F.M Na CI = 23 + 35 .5 = 58.5
Mass of NaCl in $5cm^3$ = 2.41 x 10-2 x 58.5
= 1.41g

v. Mass of water = 5.35 – 1.41
= 3.94g

vi.3.94 of water contains 1.41g of NaCl
100 g of water = $\frac{1.41 \times 100}{3.94}$
=35.7

6. a).Contact process=1mk

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

ii) H_2 SO $_{4(aq(}$ SO $_{3(g)} \longrightarrow$ H $_2$ S $_2$ $O_{7(l)}$

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 (HCL $_{(g)}$ 1mk

ii.Water (H_2O $_{(l)}$ 1mk

b)……..

c) i.Green ppt(1mk)

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

$Fe^{2+}_{(aq)} + 2OH_{(aq)} \longrightarrow Fe(OH)_{2(s)}$ 1mk

d) Mass of $1000cm^3$ of solution = 1000 x 1.18 $^{1}/_{2}$mk

= 1180g $^{1}/_{2}$mk

Mass of HCl = $\frac{35}{100}$ x 1180 ½ mk

= 413g ½ mk

Molarity = $\frac{413}{36.5}$ ½ mk

= 11.3151 M ½mk