**MARKING SCHEME**

**CHEMISTRY FORM 4**

**SECTION A (50MKS**)

 **1.** a)- glass does not react with most chemicals ½

 - it is transparent one can see when the reaction is taking place ½

 or it is easy to clean

  b) Name: Desicator ½

 Use : Drying or keeping substance from moisture ½ crystals

  Name: evaporating dish

 Use: evaporating liquids to obtain crystals

**2.**

 Working diagram 1

* Place the mixture into the separating funnel and let it settle ½
* On separating into layers open the tap
* Allow the first layer to drain the close the tap

 **3. (**i)Hydrogen chloride gas donates hydrogen chloride

 (ii) Level of ionisation / dissociation

 **4.** a) K, L, M, J

 b) J

 **5.** a)🗸 Bursts into lilac flame ½

* Darts on the surface of the water ½
* Produces a hissing sound ½
* Floats ½

  b) 2K(s) + 2H2O(l)  2KOH(aq) + H2(g) 1

**6. (**a) Q = 2.8.5

 R = 2.7

  (b)

 (c) Halogens

 **7. (**i)C ½ good conductor of electricity ½ in both solid and liquid state due to delocalised electrons

 (ii) D or E ½ are poor conductor in both solid / liquid state

 Have relatively low Mpt and Bpt due to molecular structure ½

  iii) A - mobile / free ions 1

 B - delocalised electrons 1

**8.** Add excess dilute nitric (V) acid to the given ½ calcium oxide.

 Calcium nitrate is formed ½

 Add sodium carbonate solution / K2CO3 //

 (NH4)2CO3(aq) ½ to the calcium nitrate ½ solution formed, filter obtain CaCO3 as residue ½

 **9.**

**10.(** a)Glass apparatus withstand the high temperatures used in this experiment and are corrosion

resistant

  (b) Nitric (V) acid prepaid has dissolved NO2

**11.** 1 - Compressed hot air in 1

 2 - Molten froth of sulphur water mixture out

 3 - superheated water-in 1

 **12.** a) X - hydrogen gas ½

  b) To increase the surface area of absorption of hydrogen chloride gas in water 1

  c) Manufacture of dyes, drugs, photographic materials. A commonly laboratory reagent used in schools and in researched institutions

 **13.** a) Volume is inversely proportional to

pressure (P  1/V)

 b) P1V1 = P2V2 ½

 T1 T2

P1 = 750mmHg

 V1 = 600cm3

 T1 = 273 - 23 = 250K ½

 P2 = 900mmHg

 V2 = ?

 V2 = 750 x 600 x 306 1 = 612cm3 1

 250 x 900

**14.** 10 molecules = 1.0667 x 10-21 ½

 6.0 x 1023 = ?

 = 6.0 x 1023 x 1.0667 x 10-21 ½

 10

 = 64.002g 1

**15.** CxHy(g) + O2(g)  CO2(g) + H2O(g)

 10cm3 90cm3 30cm3

  Excess volume of = 70 - 30 = 40cm3 ½

 oxygen

  volume of O2 reacted = 90 - 40 = 50cm3

 CxHy(g) + 5O2(g)  3CO2(g) + 4H2O(g) ½

 empirical formula = C3H8 ½

**16.** a) Propane Propan-2-ol



  b) Bubble the two gases separately through acidified potassium manganate (VII) 1

 Propene decolourises it but not propane 1

 Or Bubble the two gases separately through bromine 1 (liquid or water) in the dark propene decolourises but not propane 1

**17.** Reactants Products

 C-C = 348 x 1 = 348 C-C= 348 x 1 = 348

 C-H = 6 x 414 = 2484 C-H = 5 x 414 = 2070

 Cl-Cl = 243 x 1 = 243 C-Cl = 432 x 1 = 432

 +3075KJ/mol -2850KJ/mol

 H = 3075 - 2850

 = + 225KJmol-1 1

**SECTION B (50MKS)**

**18. (a) (**i) Same group : U  and Y 

  (ii) Same period: V, W and X 1

  b) i) X, Bpt = (-186 + 273) 1

 = 87K below room temp. 1

  ii) X 1

  c) i) V3(SO4)2

 = V2(SO4)3 1

  ii) Y(s) + W2  2Y2W(s) 1

 d) Ionic bond 1

 U loses electrons the electrons gained by W 1

  e) i) Cathode

 Hydrogen gas 1

  ii) Anode: oxygen gas 1

 **19.** a) FeS­(s) + 2HCl(aq)  FeCl2(aq) + H2S(g)

b) Blackens wet lead ethanoate powder

 (any other possible test) 1

  (c) (i) A green solution is formed

  (ii) 2FeCl3(aq) + H2S(s)  2FeCl2(aq) + 2HCl(aq) 1

  d) i) T - carbon 1

 U - carbon (IV) oxide 1

 D - ethanol 1

 W - ethene 1

 Y - acidified potassium manganate (VII)

 ii) Dehydration 1

 **20.** a) (i) P – ethylethanoate formula

  (ii) 1, 2, dibromo-ethane



  (iii) ethane



  b) reaction process

 V –Addition halogenation

  T - Substitution

 P - Esterification

  c) Concentrated H2SO4

 d) 28n = 84000 1

 n = 3000 1

  e) 2CH3CH2OH(l) + 2Na(s)  2CH3CH2ONa(s) + H2(g)

f) W burns with a blue flame 1

 C2H4 burns with a yellow sooty flame 1

21.  **(**a) The enthalpy change that occurs when one mole of H+ ion react with one mole of OH ion forming one mole of water

  (b) H+(aq) + OH–(aq) H2O(l)

  i) The volume of mixture = (100 + 50)cm3

 = 150cm3

 Mass of mixture = 150

 1000

 = 0.15kg

 Average initial temp. = 25 + 25 = 50 = 250C

 2 2

 Change in temp.

 = 34 - 25 = 9oC

 H = MCT

 = 0.15 x 4.2 x 9

 = 5.67KJ

 ii) Moles of NaOH

 If 1000cm3contains 2 moles

 Then 50cm3 contains 50 x 2 = 0.1 moles

 1000

 If 0.1 moles evolve 5.67KJ

 Then 1 moles evolve 5.67 = 56.7kJ

 0.1

 Hnuet = -56.7kJ/mole

 iii) NH4OH is a weak base that dissociates

 partially while NaOH is a strong base that dissociates completely. Some heat is absorbed before neutralisation takes place for NH4OH

  d) NaOH(aq) + HCl(aq)  NaCl(aq) + H2O(l) Hnuet = -56.7KJ/mole

  e)

 

22. a) Haemitite Fe2O3 or magnetite Fe3O4

  (b) Silicon (IV) oxide (silica) / Aluminium oxide

  (c) Hydrated iron (III) oxide 1