**2018**

**FORM THREE**

**CHEMISTRY**

**PAPER**

**M A R K I N G S C H E M**

1. (a) (i) Same group : U and Y

 (ii) Same period: V, W and X

 b) i) X, Bpt = (-186 + 273)

 = 87K below room temp.

 ii) X

 c) i) V3(SO4)2

 = V2(SO4)3

 ii) Y(s) + W2 2Y2W(s)

 d) Ionic bond

 U looses electrons the electrons gained by W

 e) i) Cathode

 Hydrogen gas

 ii) Anode: oxygen gas

2. I. a) Blue copper (II) sulphate turned to white.

 - Colourless liquid condenses on the cooler parts

of the apparatus.

  b) Water

  c) i) Condense the vapour

  ii) Salts acts as an impurity lowers the freezing

 point of ice.

  iii) To prevent the condensing water from

running back into the hot boiling tube and

crack it.

  d) Take a sample of substance F and add it to blue

anhydrous cobalt (II) chloride which will turn to

pink.

 NB: Anhydrous white copper (II)( sulphate can

also be used.

II. Mass of water = 12.5 - 8.0

 = 4.5g



 CuSO4.5H2O

1. a)
2. CO2 is collected by downward delivery🗸1mk
3. Exchange apparatus containing water and concentrated sulphuric (IV) acid.🗸1
4. Use dilute hydrochloric acid for dilute sulphuric acid🗸1

b)

* It does not support combustion🗸1/2
* It is denser than air🗸1/2

c) i)

* M-Ammonia gas
* Q-carbon (iv) oxide

 ii)

* F-Ammonium chloride
* X-Sodium hydrogen carbonate

 iii)

* L-Calcium chloride
* Used as a drying agent

 iv) Tower P-NH3(aq)+CO2(g)+Nacl(aq)+H2O(l) Na4HCO3(s)+NH4Cl(aq)

 v) Sodium chloride, Ammonia, coke or limestone

4. a) Sulphur powder ½

 b) Sulphur (IV) oxide ½

 c) Barium sulphate ½

 d) Copper (II) nitrate ½

1. 2H202(l) MnO2 2H2O(l) + O2(g) 1
2. a) 4K(s) + O2(g) 2K2O(s)1

 b) S(s) + O2(g) SO2(g) 1

c) CuO(s) + H2SO4(aq) CuSO4(aq) + H2O(l) 1

 Introduce a glowing splint into a gas jar containing oxygen gas, if the splint relights the gas is oxygen. 1

 Ba2+(aq) + SO42- BaSO4(s)1

1. - It combines with acetylene to form oxyacetylene used in welding.

 - Used in hospitals by people with breathing problems.

 - Mountain climbers and deep sea drivers.

 - Oxyhydrogen – welding.

5. (a) (i)

Baseline

✓ 1

A

B

C

D

✓ ½

✓ ½

✓ ½

✓ ½

(ii) A and C ✓ 1

(b) Place the mixture in a beaker and cover it with a watch glass containing cold water ✓ ½. Heat the mixture. Ammonium Chloride sublimes ✓ ½ and collects on the cooler parts of the watch glass while Sodium Chloride which does not sublime remains in the beaker. ✓ 1

(c) (i) Fractional distillation ✓ ½

 (ii) Since the two liquids are immiscible,pour the two in a separating funnel and allow them to settle

✓ ½ The dense liquid settles at the bottom and the less dense forms a second layer on top ✓ ½. Open the tap and run out the liquid✓½ in the bottom layer leaving the liquid in the upper layer.✓ ½.

 (c) (i) Fractional distillation ✓ ½

 (ii) Molecular mass/density/boiling point. ✓1✓ 1

6. (a) The rate of diffusion of a gas at constant temperature and pressure is inversely proportional to the square root of its density. √1

 (b) Molar mass of SO2 = 32 + 16 x 2 = 64g

 Molar mass of CO2 = 12 + 16 x 2 = 44g

 TA = MMA , TSO2 = MMSO2

 TB MMB TCO2 MMCO2

 4 = 64

 TCO2 44 √

 4 = 1.206

 TCO2 1

 TCO2 = 4 √

 1.206

 TCO2 = 3.32 seconds √

 (c ) (i) Mg + 2HCl (aq) MgCl2 (aq) + H2 (g)

 1 mol 2 mol 1 mol 1 mol

 0.1 mol 1000cm3

 ? 50

 50 x 0.1 = 5 = 0.005 moles of HCl

 1000 1000

 Moles of Mg

 1 mole weigh 24g

 ? 4g

 4 x 1 = 0.167 moles

 24

 Moles of Mg that reacted = 0.005 moles √ ½

 Excess Mg 0.167 – 0.005 = 0.162 moles √ ½

***This paper consists of 6 printed pages***

***Turn Over***

 (ii) Moles of H2 produced = 0.005 moles

 1 mole of H2 (g) occupies 24000cm3 at r.t.p

 0.005 mol ?

 0.005 x 24000

 = 120cm3

 (d) 1. Manufacture of margarine ( to harden oils )

 2. Oxy-hydrogen flame, used for welding and cutting some metals.

 3. Manufacture of ammonia, in the haber process.

 4. Manufacture of hydrochloric acid.

 (e) Heating ammonium chloride, decomposes to form ammonia gas and hydrogen chloride gas.

 NH4Cl Heat NH3 (g) + HCl (g)

 NH3 is lighter, diffuses faster than HCl (g)

 NH3 gets to the moist red – litmus paper first, turns it blues as its basic

 HCl gas then turns the blue litmus paper red.

7. a) (i) Fractional distillation

 (ii)



(iii) Asphalt/all weather roads/ water proofing roofs (1 mark)

(iv) The column is divided into several compartments, the crude oil vapour rises up the column with the different fractions condensing (1/2 mark) in different compartments according to their boiling point/volatility (1/2 mark)

(v) Changamwe / Mombasa (1 mark)

b) (i) To allow enough time for contact between copper and air/ to ensure all the oxygen was used up. (1 mark)

(ii) Copper metal turned black / volume of air reduced (1 mark)

(iii) No. (1/2 marks) Reaction would be violent/explosive potassium would also react with nitrogen (1/2 mark)

c) (i) Hydrated iron (III) oxide/ brown coating that forms on iron/steel /objects made from iron

(ii) Fe2O3.nH2O (n/1/2/3). (1 mark)

(iii) Coating iron sheets with zinc (1 mark)

**Q6.** a) (i) Heat/enthalpy of combustion of carbon/enthalpy of formation of carbon (IV) oxide (1mark)

(ii) Heat/enthalpy