**TOP EVALUATION EXAMINATIONS-2016**

**FORM FOUR**

**JULY/AUGUST**

**CHEMISTRY**

**PAPER 2**

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

**1**

a) i) Iü1 ; most electronegative // has highest electron affinity.

 ii) Halogens 1



 iii)

 iv) F is bigger // has a bigger atomic radius than I. 1

 I has stronger nuclear attraction than F, hence its electrons are strongly attracted to the nucleus.

b) i) Its ions in the solid state are held in fixed position and are not mobile .

 In liquid state the ions become mobile, hence conduct an electric current.

 ii) Giants atomic structure. ½. High ½ melting and boiling points but does ü½ not conduct in molten /solid state.

 Q its M.P is lower than room temp but its B.P is higher than room temp.

1. a) (i) Hydrogen

 (ii) Reducing agent

 (iii) Tube I CUSO45H2O CUSO4(s) + 5H2O

 Tube II 3Fe(s) + 4H2O(g) Fe3O4 + 4H2(g)

 b) (i) Blue solid turns white/colourless liquid; loss of water of crystallization.

 Combustion III

 Black solid turns brown. copper (ii) oxide reduced to copper metal.

 c) (i) To produce steam

 (ii) hydrogen

 (iii) water

 (iv) Decrease the freezing point of water

 (v) Hydrogen is flammable

3.

 (i) 85.3 - 84.5 = 0.5g

 ii) 35.6 - 23.6 = 12.0°C

 iii)

 iv) Molecular mass of CH3CH2OH

 12 × 2 + 6 + 16 = 46g

 0.5g  10.08kJ

 46g  x

 0.5x = 10.08 × 46

 x = 10.08 × 46

 0.5

 = -927.36 kJ mol-1

 **accept answer using moles.**

B. Heat lost to the surrounding is not accounted for.

C. i) CH3CH2OH + 3O2  2CO2 + 3H2O

 H = -927.36 kJmol-1

 Unbalanced award 0

 Condition : wrong formular award 0 ignore state symbol.



 ii)

4/I (a) Graphite electrodes

(b) Cu2+, H+ ions

(c) Cl- ions (higher concentration)

(d) Cu2+(aq) + 2e- Cu(s)

(e) The green colour of CuCl2 fades because Cu2+ ions are discharged.

 II. (a) W

 (b) V2 – Used as the reference electrode.

(c) W and Y

 1.09 – (-2.87) = 3.96v

(d) W(s)/W2+(aq)// Y2(g) /Y-(aq); Pt

(III)

1. Zinc ions are produced at the zinc electrode.
2. The salt bridge maintains a balance between the ions in both parts of the cell.
3. Cu2+(aq) + 2e- ==> Cu(s) and 4OH-(aq) - 4e- ==> 2H2O(l) + O2(g)

It takes a transfer of 2 moles of electrons to form 1 mole of solid copper (63.5g) from 1 mole of copper(II) ions, Cu2+

and a transfer of 4 moles of electrons to form 1 mole of oxygen from 4 moles of hydroxide, OH- ions.

herefore the expected mole ratio of Cu(s) : O2(g) from the electrolysis is 2 : 1

The moles of Cu deposited = 254/63.5 = 4 moles

1. moles oxygen formed = 2 moles, since Mr(O2) = 2 x 16 = 32
2. mass of oxygen formed = 2 x 32 = 64g, volume of oxygen = 2 x 24 = 48 dm3

5. a) (i) Copper (II) oxide // CuO ¹

 (ii) Sodium hydroxide // NaOH ¹ (2 marks)

 (b) (i) Manganese (IV) oxide ¹

 (ii) Sulphur ¹

 (iii) Water ¹

 (iv) Excess oxygen ¹ (4 marks)

 (c) Heat ¹ (1 marks)

 (d) (i) 2H2O2(aq) 2H2O(l) + O2(g) ¹

 (ii) 2Na(S) + O2(g)  Na2O2(S) ¹ (2 marks)

e)Black solid as copper (II) oxide is formed

1. (i) Cuprite/chalcocite/malachite any 2 correct

(ii) Froth flotation

 Use: Concentrate the ores

(iii) 2CuFeS2(s) + 4O2(g) 3SO2(g) + 2FeO(s) + CU2S(s)

 b) (i) Anode: Impure copper

 Cathode: pure copper

 Electrolyte: Copper (ii) Sulpahte

 (ii) Anode: Cu(s) Cu2+(aq) + 2e

 Cathode Cu2+(aq) +2e- Cu(s)

1. 64g – 2 moles of e-

 1 mole – 96500c

 32g 1 mole i.e.

 96500 = 10 x t

 9650 sec = t

 c)

* Making copper wires and contact in switches
* making soldering instruments
* Manufacture of alloys
* Making coins and ornaments Any 1 correct