**MARKING SCHEME**

1. a) This is to avoid an explosion because a mixture of hydrogen and air is highly explosive1

b) Grey solid observed 1

c) i) PbO(s) + H2(g)  Pb(s) + H2O(l)1

ii) 2H2(g) + O2(g) 2H2O(l)/(g)1

d) To prevent re-oxidation of the hot metallic lead by atmospheric oxygen1

e) To prevent water formed in the reaction form running back into the hot part of the glass tube that can cause it to crack1

f) i) Mombasa is around the Indian Ocean whose water is salty while Kisumu is around lake Victoria whose water is fresh½

Salt accelerates rusting hence cars in Mombasa will rust faster than in Kisumu½

ii) Water ½ and oxygen ½

iii) Oiling, greasing, painting, galvanizing, electroplating, sacrificial protection, use of silica gel.

***(any two for 1mk)***

iv) Tube of tap water contains dissolved oxygen while tube of boiled water has no oxygen. 1

v) - A mixture of oxygen and acetylene burns with hot flame used in welding and cutting of metals

- Oxygen mixed with hydrogen is used in rocket fuel

- Oxygen is used in steel making where it oxidizes impurities in molten iron.

- Oxygen is used in hospitals for patients with breathing problems

- Oxygen is used by high mountain climbers and deep sea divers.

***any two for 1mk***

**2.** a) Covalent1 Both elements are non-metals1

b) i) DG21

ii) EG31

c)DG2 has higher melting point than EG3 1

DG2 has giant ionic structure with strong ionic bonding1

EG3 has a molecular stricture with weak van der waals forces1

d) i) DO1 Basic oxide1

ii) FO21 acidic .oxide1

e) A½ It is a noble gas with the outermost energy level fully occupied by electrons½

f) D and E1 they contain delocalised electrons1

g) Transition elements/Transition metals1

**3.** (a) **add aqueous sodium carbonate** 1 **to precipitate** ½ **calcium carbonate and magnesium carbonate and filter.** ½

I Cathode

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2H+(aq)** | **+ 2e** | **H2(g)** |

(1 mark)

II Anode

|  |  |  |
| --- | --- | --- |
| **2Cl-(aq)** |  | **Cl2(g) +2e-** |

(1 mark

Name: I Product at U **Sodium Hydroxide/ NaOH** 1

II Another material that can be used instead of titanium (mark)

**Graphite/platinum** 1 **reject carbon**

III The impurity present in the product at U (1mark)

**sodium chloride/ Nacl** 1

IVState two functions of the diagram (2marks)

**- To prevent mixing of chlorine gas with sodium hydroxide. To allow free movement of ions.** 1

**- It prevents the mixing of chlorine gas and hydrogen gas.** 1

c) Give one industrial use of the product at U. (1 mark)

**- Manufacture of soap/detergents** 1

**- Used to make bleaching agents**

**- Used to make bleaching agents**

**- Used in purification of bauxite**

**- In paper industry**

(Accept any one correct)

d)

**- Chlorine gas produced is very poisonous and it affects the respiratory system of animals**

**- Causes acid rain that causes corrosion of buildings / yellowing of plants etc.**

**4.** a) Sulphur, iron (II) sulphide, zinc (II) sulphide, lead (II) sulphide, copper (i) sulphide

***any 3***

b) i) Dust ½, arsenic compounds /arsenic oxide½

ii) To avoid poisoning of the catalyst 1

c) 2SO2(g) + O2(g)   2SO­3(g)1

d) i) -Vanadium (V) oxide 1

- Platinum /platinised asbestos 1

ii) -Vanadium (V) oxide½

- It is cheaper and not easily poisoned ½

e) The reaction is highly exothermic causing

the solution to boil forming mist1 of sulphuric (VI) acid spray which is corrosive

g) Sulphur (IV) oxide ½

h) - Recycling the unreacted gases 1

- Reacting the unreacted gases with oxides or carbonates of metals or with heated carbon

***any one***

**5.** a) Na(s)/Sodium metal 1

- It has the highest negative reduction potential 1 /(E)

b) +0.80 - (-0.76)½ = + 0.80 + 0.76 = + 1.56V1

c) Zn(s) /Zn2+(aq) //Ag+(aq) /Ag(s)1

d) i) X - Cathode1 Y - anode1

ii) Oxygen1

iii) 4OH-(aq) + 2Cu2+(aq)  2Cu(g) + 2H2O(l) + O2(g)1

iv) Q = It Q = 0.4 x (15 x 60) ½

= 360C½

Cu2+(aq) + 2e- Cu(s)½

2 x 96500 = 64g

360 = ?

360 x 64½ = 0.1194g1

19300

**6.** a) Type of reaction: Dehydration½

Reagent : Concentrated Sulphuric (VI) acid ½

Condition: 170oC - 180°C (single value in that range) ½

b) Mg(s) + 2CH3COOH(aq) (CH3COOH)2Mg(aq) + H2(g)1

c) V - Butylethanoate1

CH3COOH(aq) + CH3CH2CH2CH2OH(l)  CH3COOCH2CH2CH2CH3(aq) + H2O(l)1

d) Reagent: Soda lime½

Condition: Heat½

e) Name: Tetrachloromethane/ carbon tetrachloride ½

Structure:

½

f) Name: Polyethene/polythene½

Type of reaction: Addition reaction/Addition polymerization1

g) Molecular mass of -CH2 - CH2 - = 14 + 14

= 28½

n = 44800½ = 1600

**7.** a) CaCO3(s) + 2HCl(aq) CaCl2(aq)  + H2O(l) + CO2(g)1

b) The carbon (IV) oxide formed escaped into the atmosphere1

c) To prevent acid from spraying out1

d) In the graph paper (***3mks)***

e) 1mk for curve 35°C

f) - The reaction rate would increase½

- Marble powder offers a larger surface area than chips, which causes the rate of reaction to increase1

g) There would be formation of insoluble calcium sulphate that would coat calcium carbonate (Marble chips) stopping the reaction1

