

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) $\text{PbO}_{(s)} + \text{H}_{2(g)} \rightarrow \text{Pb}_{(s)} + \text{H}_2\text{O}_{(l)}$ ✓ 1
ii) $2\text{H}_{2(g)} + \text{O}_{2(g)} \rightarrow 2\text{H}_2\text{O}_{(l)}$ ✓ 1
d) To prevent re-oxidation of the hot metallic lead by atmospheric oxygen ✓ 1
e) To prevent water formed in the reaction from 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) DG_2 ✓ 1
ii) EG_3 ✓ 1
c) DG_2 has higher melting point than EG_3 ✓ 1
 DG_2 has giant ionic structure with strong ionic bonding ✓ 1
 EG_3 has a molecular structure with weak van der Waals forces ✓ 1
d) i) DO ✓ 1 Basic oxide ✓ 1
ii) FO_2 ✓ 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



(1 mark)

II Anode



(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

IV State 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) $2\text{SO}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightarrow 2\text{SO}_{3(\text{g})}$ ✓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 ✓1/2

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 / (E⁰)

b) +0.80 - (-0.76) ✓1/2 = + 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) + O_{2(g)} ✓1

iv) Q = It Q = 0.4 x (15 x 60) ✓1/2
= 360C ✓1/2

Cu²⁺_(aq) + 2e⁻ → Cu_(s) ✓1/2

2 x 96500 = 64g

360 = ?

360 x 64 ✓1/2 = 0.1194g ✓1

19300

6. a) Type of reaction: Dehydration ✓1/2

Reagent : Concentrated Sulphuric (VI) acid ✓1/2

Condition: 170°C - 180°C (single value in that range) ✓1/2

b) Mg_(s) + 2CH₃COOH_(aq) → (CH₃COOH)₂Mg_(aq) + H_{2(g)} ✓1

c) V - Butylethanoate ✓1

CH₃COOH_(aq) + CH₃CH₂CH₂CH₂OH_(l) → CH₃COOCH₂CH₂CH₂CH_{3(aq)} + H₂O_(l) ✓1

d) Reagent: Soda lime ✓1/2

Condition: Heat ✓1/2

e) Name: Tetrachloromethane/ carbon tetrachloride ✓1/2

Structure:

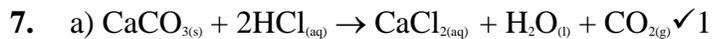
✓1/2

f) Name: Polyethene/polythene ✓1/2

Type of reaction: Addition reaction/Addition polymerization ✓1

g) Molecular mass of -CH₂ - CH₂ - = 14 + 14
= 28 ✓1/2

n = 44800 ✓1/2 = 1600



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

