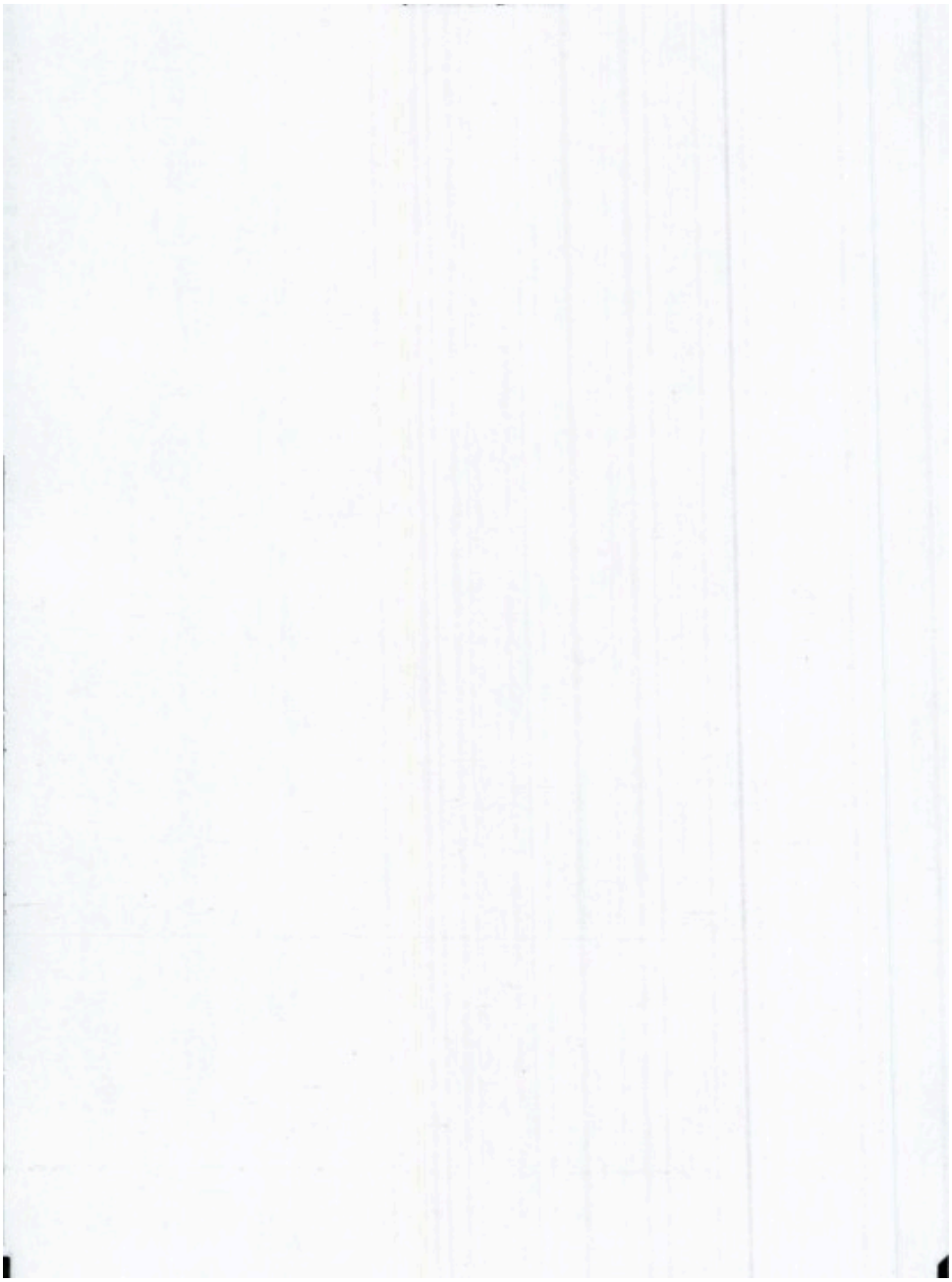
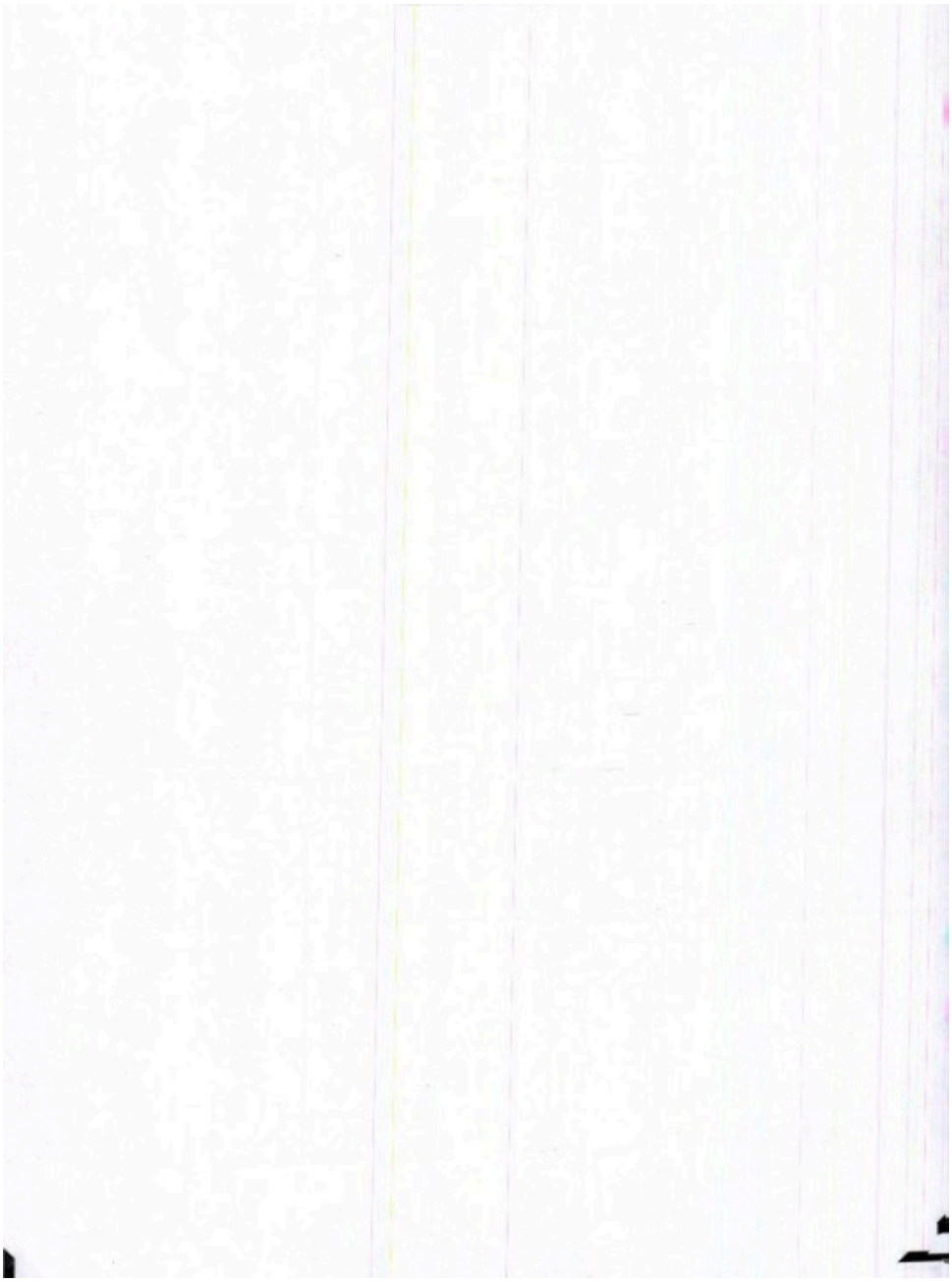
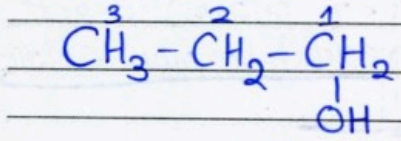




Use for rough work

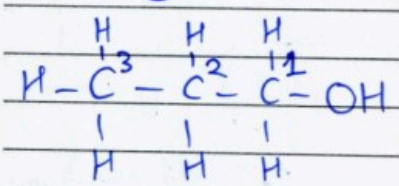
Q. No. 2 Part (i)

Structural formula:-



Propan-1-ol.

Displayed formula:-



Propan-1-ol.

Q. No. 2 Part (ii)

Data:-

mass of NaOH = 20g

volume = 1 dm^3.

Required:-

Concentration in mol/dm^3 = ?

Sol.

moles of NaOH = $\frac{\text{mass}}{\text{Molar mass}}$

$\Rightarrow$ moles of NaOH = $\frac{20}{40}$ 1 2

$\Rightarrow$ moles of NaOH = 0.5 moles

∴ Concentration in mol./dm^3 = 0.5 mol./dm^3

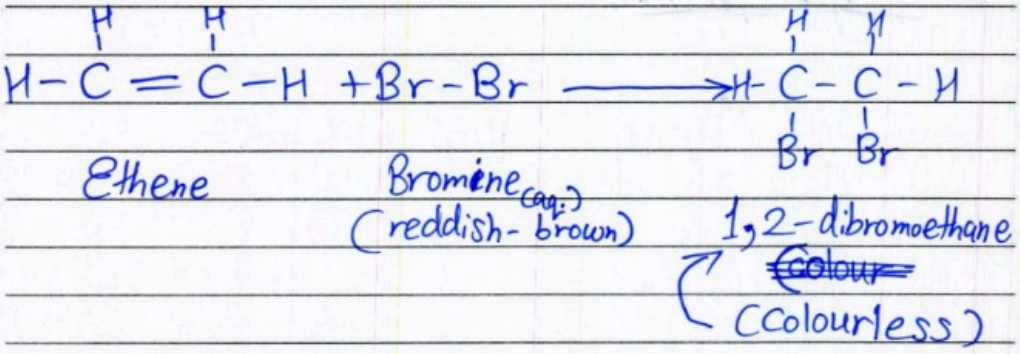
This is because 20g of NaOH is 0.5 moles in 1 dm^3, so:

concentration ~~conc.~~ in mol./dm^3 = 0.5 mol./dm^3

Q. No. 2 Part (iii)

When an unsaturated hydrocarbon (i.e. with two or more bonds between Carbon atoms) reacts with aqueous Bromine, the reddish-brown colour of Bromine ~~fun~~ turns colourless.

Equation:-



Q. No. 2 Part (iv)

Polymer:-

A polymer is a long chain of small, repeating units known as Monomers. Polymers are developed through a process known as polymerization. There are two types of polymers: addition polymers and condensation polymers.

Examples:-

- Addition polymers: Polyethylene, Polyvinylchloride.
- Condensation polymers: Polyethylene terephthalate (PET), Nylon-6,6.

Q. No. 2 Part (v)

Metal reacts with a dilute acid:-

When a reactive metal reacts with a dilute acid, a salt is formed with Hydrogen gas.

Example:-

$$Mg + 2HCl \longrightarrow MgCl_2 + H_2$$

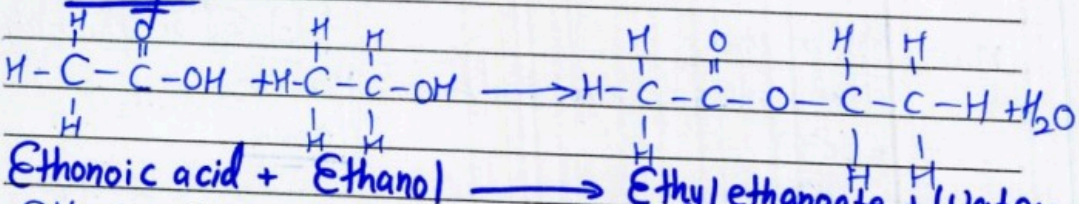
When Magnesium metal reacts with Hydrochloric acid, the salt Magnesium Chloride is formed with Hydrogen gas.

Q. No. 2 Part (vi)

Esterification:- formed

Esterification is the process by which esters are ~~formed~~. Carboxylic acids and alcohols react together in order to form an ester and release water, in vapours.

Example:-



Ethonoic acid + Ethanol → Ethyl ethanoate + Water

$CH_3COOH + CH_3CH_2OH \rightarrow CH_3COOCH_2CH_3 + H_2O$

Q. No. 2 Part (vii)

Three advantages of a Hydrogen-Oxygen fuel cell are as follows:

- They use renewable resources of Hydrogen and Oxygen so can easily form energy any time without the use of fossil fuels.
- They do not produce any harmful or greenhouse gases. Fossil Fuels can produce various harmful greenhouse gases that harm our environment, however Hydrogen-Oxygen fuel cells do not.
- The water vapour they release can be condensed into water e.g. in astronaut suits, water is stored by condensing water vapours.

Q. No. 2 Part (viii)

Empirical formula is CH_2O.
Molar mass is 180 g/mol.
Molecular formula = ?

Solution:-

Molar mass of empirical formula = 12 + 2(1) + 16
= 12 + 2 + 16
= 30 g/mol

$n = \frac{\text{Molar mass}}{\text{Molar mass of empirical formula}}$
$= \frac{180}{30}$
$\Rightarrow n = 6$

Molecular formula:
Molecular formula $= (CH_2O)_n$
$= (CH_2O)_6$
$= C_6H_{12}O_6$ Ans

Q. No. 2 Part (ix)

Data:-
moles of KNO_3 = 0.25 moles.
Volume = 1 dm^3.
Concentration in g/dm^3 = ?

Solution
mass of KNO_3 = moles × molar mass
Molar mass of KNO_3 = 39 + 14 + 3(16)
= 39 + 14 + 48
= 101 g
∴ mass of KNO_3 = 0.25 × 101
= 25.25 g
∴ Concentration in g/dm^3 = 25.25 g/dm^3 Ans.

Q. No. 2 Part (x)

Two sources of Vitamin A: Spinach, Kale, Nuts, etc.

Functions of Vitamin A: Improved eyesight, immune system function, etc.

Q. No. 2 Part (xi)

Production of ethanol through hydration of ~~stea~~ ethene:-

$$\underset{\text{Ethene}}{CH_2=CH_2} + \underset{\text{Water}}{H_2O} \xrightarrow{H_3PO_4} \underset{\text{Ethanol}}{CH_3-CH_2-OH}$$

Steam is added to ethene under a catalyst of Phosphoric acid (H_3PO_4) in order to convert it into ethanol.

Q. No. 3 (Page 1)

:- Four Patroleum fractions & Uses:-

1. Bitumen:- Used for paving roads and roof material.
It is the longest (in terms of Carbon chain) fraction in the fractional distillation tower of crude oil. It has the lowest volatility

2. Patroleum/Grasoline- Used as fuel for cars, motorbikes, trucks, etc.
It is the second fraction from the top, hence has the second-best volatility.

3. Naphtha – Chemical feedstock for making drugs, plastics, explosives, etc.
It is the third fraction from the top, hence has the third-best volatility. It also has the third shortest Carbon chain.

4. Kerosene- It is used extensively for cooking, heating and lighting.
It is the fourth fraction from the top, so has the fourth-best volatility, and fourth-shortest Carbon

Q. No. 3 (Page 2)

-: **Acidic Oxides:-**

Acidic oxides are oxides which form acids when they react with water. They are oxides of non-metals.

SO_2 is an acidic oxide.

- **Chemical equation:**

$$SO_2 + H_2O \longrightarrow H_2SO_3$$

This is not part of the answer

We see that when SO_2 and H_2O react, they form an acid, H_2SO_3.

-: **Basic oxides:-**

Basic oxides are oxides of metals.

Basic oxides are oxides which form bases when they react with water. When they react with acids, they form salts and water.

CuO is a basic oxide.

- **Chemical equation:**

$$CuO + H_2O \longrightarrow Cu(OH)_2$$

Copper oxide — water — Copper Hydroxide

$$CuO + 2HCl \longrightarrow CuCl_2 + H_2O$$

Copper oxide — Hydrochloric acid — Copper chloride — water

-: **Amphoteric oxides:-**

Amphoteric oxides form both acids and bases when they react with water. They are oxides of acids or bases.

Q. No. 4 (Page 1)

–: Acidic Oxides:-

Acidic oxides are oxides that form acids when they react with water. Acidic oxides are oxides of non-metals.
SO_2 is an acidic oxide.

- **Chemical equation:**

$$SO_2 + H_2O \longrightarrow H_2SO_3$$

–: Basic Oxides:-

Basic Oxides are oxides that form bases when they react with water. Basic oxides are oxides of metals.
CuO is a Basic oxide.

- **Chemical equation:**

$$CuO + H_2O \longrightarrow Cu(OH)_2$$

Copper oxide — water — Copper Hydroxide

$$CuO + HCl \longrightarrow CuCl_2 + H_2O$$

Copper oxide — Hydrochloric acid — Copper chloride — Water

–: Amphoteric Oxides:-

Amphoteric oxides form ~~either base or acid~~ → salts when they react with ~~water~~. They are oxides ~~of~~ metals or non-metals. → acids or bases
Al_2O_3 is an amphoteric ~~oxide~~.

- **Chemical equations:**

$$Al_2O_3 + 6HCl \longrightarrow 2AlCl_3 + 3H_2O$$

$$2Al_2O_3 + 4NaOH + 6H_2O \longrightarrow 4NaAl(OH)_4$$

Q. No. 4 (Page 2)

Q. No. 5 (Page 1)

Percentages:-

C = 38.71 %

H = 9.68 %

O = 51.61 %

Empirical formula = ? , Molecular formula = ?

Solution:-

- Moles:-

$C = \frac{38.71}{12} = \boxed{3.22}$

$H = \frac{9.68}{1} = \boxed{9.68}$

$O = \frac{51.61}{16} = \boxed{3.22}$

- Molar Ratio:

C : H : O

⇒ 3.22 : 9.68 : 3.22

Dividing by smallest,

$\frac{3.22}{3.22} : \frac{9.68}{3.22} : \frac{3.22}{3.22}$

$\therefore 1 : 3 : 1$, So empirical formula = $\boxed{CH_3O}$ Ans

Q. No. 5 (Page 2)

For Molecular formula:

Molar mass = 62 g/mol.

Molar mass of Empirical formula = 12+3(1)+16
= 12+3+16
= 31 g/mol.

$n = \frac{\text{Molar mass}}{\text{Molar mass of empirical formula}}$

$\Rightarrow n = \frac{62}{31} = 2$

$\Rightarrow \boxed{n = 2}$

So,
Molecular formula = $(CH_3O)_n$
$= (CH_3O)_2$

$\therefore$ Molecular formula = $\boxed{C_2H_6O_2}$ Ans

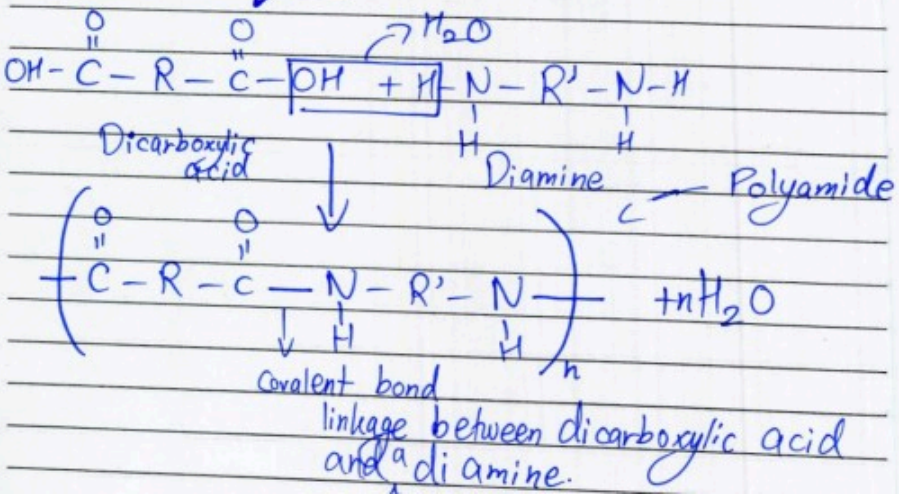
Q. No. 6 (Page 1)

Formation of a polyamide from a dicarboxylic acid and a diamine :-

A polyamide is a condensation polymer that is formed by the condensation polymerization of a dicarboxylic acid and a diamine.

Polyamides have a **Single covalent bond** linkage between a Nitrogen atom and the carbon atom of a carboxyl group. It also releases water when the bond is formed.

General Equation:



Q. No. 6 (Page 2)

- **Example:**

Nylon – 6, 6 :-

Formed by hexamethylenediamide and Adipic acid.

