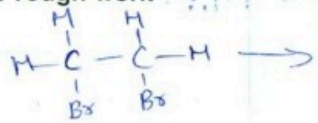




Use for rough work



$CH_3CH_2OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$

3.22

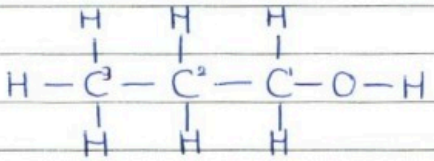
9.68

3.22

~~Mg~~

$Na + HCl \rightarrow NaCl + H_2$

Q. No. 2 Part (i) **Structural formula:-**



Displayed formula:-

$\rightarrow CH_3-CH_2-CH_2OH$

Q. No. 2 Part (ii) **Concentration (mol/dm³):-**

- Molar mass of NaOH = 23 + 16 + 1
  = 40 g/mol
- no. of moles = $\frac{\text{mass of NaOH}}{\text{m.m of NaOH}}$

$$\text{moles} = \frac{120}{240}$$

moles = 0.5 mol

- Concentration = $\frac{\text{moles}}{\text{volume}}$

$$\text{Concentration} = \frac{0.5}{1}$$

Concentration = 0.5 mol/dm³

→ Concentration of solution is 0.5 mol/dm³.

Q. No. 2 Part (iii) **Fossils fuels:-**

The natural substances or compounds that can be used as fuel are called fossils fuels. Due to their natural occurance, they are said to be formed by the dead matter in the soil.

- The three fossils fuels are:-

1. Coal.
2. Natural gas.
3. Crude oil.

Q. No. 2 Part (iv) ~~Applications of electroplating~~

Polymer:-

Polymers are large molecules produced by joining many smaller units called monomers. Polymers are macromolecules having many repeating units.

- The two examples of polymers are:-

1. Nylon 6,6
2. PET

Q. No. 2 Part (v) When a reactive metal reacts with dilute acid it produces salt and hydrogen gas. The reactive metal reacts vigorously with release of hydrogen gas.

- Chemical equation:-

$$2Na + 2HCl \longrightarrow 2NaCl + H_2$$

Q. No. 2 Part (vi) **Esterification:-**

The chemical process in which alcohol and carboxylic acids react to form esters is called esterification.

Example:-

$$CH_3COOH + C_2H_5OH \longrightarrow CH_3COOC_2H_5 + H_2O$$

Q. No. 2 Part (vii) **Advantages of Hydrogen-Oxygen fuel cell:-**

1. It releases a large amount of energy.
2. It uses re-newable resources.
3. It doesn't release harmful gases like CO_x, NO_x and SO_x.

Q. No. 2 Part (viii) **Molecular formula:-**

- Emperical molecular formula = $12 + (1 \times 2) + 16$
  $= 12 + 2 + 16$
  $= 30$ g/mol
- Now; $\frac{\text{Molar mass}}{\text{Emperical mass}}$
  $= \frac{180}{30}$
  $= 6$
- Molecular formula = $(CH_2O)_6$
  $= C_6H_{12}O_6$

Q. No. 2 Part (ix) **Concentration (g/dm^3):-**

- Molar mass of $KNO_3 = 39 + 14 + (16 \times 3)$
  $= 39 + 14 + 48$
  $= 101$ g/mol
- Mass of KNO_3 = moles of KNO_3 x M.M of KNO_3
  Mass = 0.25×101
  Mass = 25.25 grams
- Concentration = $\frac{\text{mass}}{\text{volume}}$
  concentration = $\frac{25.25}{1}$
  concentration = 25.25 g/dm^3
- Concentration of KNO_3 solution is 25.25 g/dm^3.

Q. No. 2 Part (x) **Alcohol burning equation:-**

~~$C_2H_5OH + O_2 \longrightarrow CO_2 + 2H_2O + Heat$~~

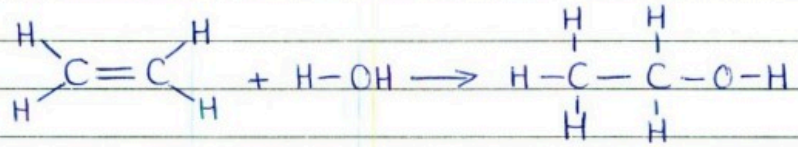
$CH_3CH_2OH + 3O_2 \longrightarrow 2CO_2 + 3H_2O + Heat$

- Names of products:

Carbon dioxide (CO_2), water (H_2O) and heat energy.

Q. No. 2 Part (xi) **Ethanol formation:-**

Equation:-



(Ethene) + (Steam) ⟶ (Ethanol)

Q. No. 3 (Page 1) **Petroleum fractions:-**

The four petroleum fractions along with their uses are listed below:

1. Liquified Petroleum gas:-

The liquified petroleum gas is the simplest fraction and has the following uses:

a) It is used as a fuel for cooking.
b) It is filled in cylinders for different purposes.

2) Petrol:-

The petrol has following uses:

a) It is used as a fuel in automobiles.
b) It is used to power small scale machines.

3) Diesel:-

The uses of diesel are:

a) It is used in trucks and buses.
b) It is used to run generators.

4) Fuel oil:-

The fuel oil is used for:

a) It is a fuel for aeroplanes and ships.
b) It fuels the large scale powerplants.

Q. No. 3 (Page 2)

Q. No. 4 (Page 1)

Given data:-

Mass of $Zn = 150$ grams

Mass of $H_2SO_4 = 200$ grams

Find:-

Limiting reactanct =?

Mass of H_2 produced =?

Balanced chemical equation:-

$$2Zn + 2H_2SO_4 \longrightarrow 2ZnSO_4 + 2H_2$$

Or

$$2Zn + 2H_2SO_4 \longrightarrow 2ZnSO_4 + 2H_2$$

- Moles of $Zn = \frac{\text{Mass of } Zn}{\text{M.M of } Zn}$

$= \frac{150}{63.5}$

$= 2.36$ mol

- Moles of $H_2SO_4 = \frac{\text{Mass of } H_2SO_4}{\text{M.M of } H_2SO_4}$

$= \frac{200}{129.5}$

$= 1.54$ mol

- According to balanced chemical equation:-

1 mole of Zn = 1 mole of H_2

2.36 moles of Zn = 2.36×1 mole of H_2

= 2.36 moles of H_2

- 1 mole of H_2SO_4 = 1 mole of H_2

1.54 moles of H_2SO_4 = 1×1.54 moles of H_2

= 1.54 moles of H_2

Q. No. 4 (Page 2) As the sulphuric acid (H_2SO_4) hass less number of moles, so it is a limiting reactant. Also it is producing less H_2 limiting the production of H_2.

• Now;

As limiting reactant can only produce 1.54 moles of H_2 then:

Mass of H_2 = moles of H_2 x MM of H_2

= 1.54 x (1x2)

= 1.54 x 2

= 3.08 grams

The mass of H_2 produced is 3.08 grams.

Q. No. 5 (Page 1) **Empexical formula:-**

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

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

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

• Now:

Carbon	:	Hydrogen	:	Oxygen
3.22	:	9.68	:	3.22
$\frac{3.22}{3.22}$	:	$\frac{9.68}{3.22}$	:	$\frac{3.22}{3.22}$
1	:	3.0	:	1

• Empexical formula:-

CH_3O

a) The rate of reaction means how quickly or slowly the reactants are used. Also how quickly or slowly the products are produced.

• Reaction rate can be measured by using the formula:

$$\text{Reaction Rate} = \frac{\Delta \text{Concentration}}{\Delta \text{time}}$$

The reaction rate can be measured by dividing change in time by change in concentration of reactants or products.

Q. No. 5 (Page 2) **b)** Reaction rate:

change in concentration = 40 − 10

= 30 mol/dm³

change in time = 20 − 5

= 15 seconds

Reaction rate = $\frac{^{2}30}{^{1}15}$

Reaction rate = 2 mol/dm³s

c) The horizontal line at end of graph indicates that reaction has completed. No reactants are being changed into products as concentration is not increasing or decreasing.

Q. No. 6 (Page 1) **Electrolysis of $CuSO_4$ using Cu electrodes:-**

Electrolytic cell structure:-

The electrolytic cell consists of a chamber in which two electrode ie anode and cathode are inserted. Both the anode and cathode are the copper electrodes. Both electrodes are connected with a battery. The anode is positively charged and cathode is negatively charged. Copper sulphate is used as an electrolyte.

Aim / Goal:-

The electrolysis of $CuSO_4$ using the copper electrodes helps to produce 99.5% pure copper metal.

Working or process:-

The electrolyte $CuSO_4$ ionizes to Cu^{2+} and SO_4^{2-} ions.

- $CuSO_4 \longrightarrow Cu^{+2} + SO_4^{-2}$

The copper anode disintegrates slowly. The oxidation causes the copper atoms (anode) to loose electrons and form Cu^{+2} cations. These cations moves towards cathode and electrons move via external circuit to the cathode. At cathode, the reduction occurs, the copper cations gain electrons and deposit on cathode as Cu. As the reaction continues, anode disintegrates and the

Q. No. 6 (Page 2) the copper deposits on cathode. The copper obtained at cathode is 99.5% pure. The electrolyte $CuSO_4$ prevents hydrolysis and the impurities like gold and silver settle down at the bottom.

- At cathode: $Cu^{+2} + 2e^- \longrightarrow Cu$
- At anode: $Cu \longrightarrow Cu^{+2} + 2e^-$