

SUBJECT: CHEMISTRY

PAPER: 2 (PRATICAL)

YEAR: 2018

QUESTIONS 1

1. (a)(i) Define the term fermentation.

Answer: Fermentation is the conversion of (aqueous) glucose/sugar to ethanol/alcohol and release of carbon (IV) oxide as a byproduct.

- (a)(ii) Name the catalyst that can be used for this process..

Answer: Zymase and Yeast

- 1b. Name two factors which determines the choice of an indicator for an acid-base titration

Answer: 1. the strength of the acid and the base involved in the titration.

2. The color change of the indicator must be sharp

1c. Consider the following reaction equation: $\text{Fe} + \text{H}_2\text{SO}_4 \rightarrow \text{FeSO}_4 + \text{H}_2$, calculate the mass of unreacted iron when 5.0g of iron reacts with 10cm³ of 1.0 moldm⁻³ H₂SO₄.

[Fe-56.0]

$$\begin{aligned} \text{(c) No. of moles of H}_2\text{SO}_4 &= \frac{10 \times 1.0}{1000} \\ &= 0.01 \text{ mol} \end{aligned}$$

$$\begin{aligned} \text{From eqn. } 1 \text{ mol H}_2\text{SO}_4 &\equiv 1 \text{ mol of Fe} \\ \therefore \text{mass of Fe reacted} &= (56 \times 0.01) \text{ g} \end{aligned}$$

$$= 0.56\text{g}$$

$$\text{Mass of unreacted Fe} = 5.0 - 0.56 = 4.44\text{g}$$

- 1d. Name one:

(i) Heavy chemical used in electrolytic cells

Answer: Tetraoxosulphate (VI) acid

(ii) Fine chemicals used in textile industries.

Answer: Dye

1e. Explain briefly how a catalyst increases the rate of a chemical reaction.

Answer: It provides an alternative pathway for the reaction to occur by lowering the activation energy.

1f. (i). Write the chemical formula for the product formed when ethanoic acid reacts with ammonia.

Answer: $\text{CH}_3\text{COONH}_4$

(ii). Give the name of the product formed in question 1f(i).

Answer: Ammonium ethanoate.

1g. List three properties of aluminum that make it suitable for the manufacture of drink cans.

Answer: A. It does not react with the acid in the drink.

B. its low density

C. It does not corrode

1h. State two industrial uses of alkylanoates.

Answer: Making of perfumes

Flavoring agent

1h(i) Name two steps involved in the crystallization of salt from its solution

Answer: Filtration and cooling of the solution

1h(ii) List two effects of global warming

Answer: Polar ice melting

Glaciers melting

QUESTION 2

A(i). State the collision theory of reaction rates.

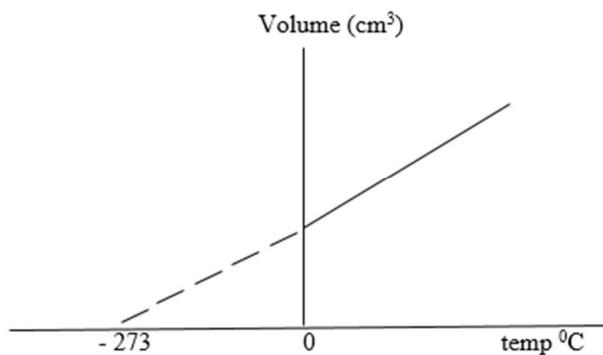
Answer: states that atoms, molecules, ions, particles reactants involved in chemical reaction must collide before reaction can take place.

A(ii). Using the collision theory, explain briefly how temperature can affect the rate of a chemical reaction.

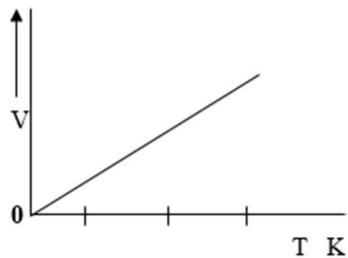
Answer: When temperature is increased or decreased, the reaction molecules gain/lose kinetic energy and move faster/slower. Frequency of collision and effective collision increases/decreases therefore rate of reaction increase/decreases.

B(i). Sketch a graphical representation of Charles' law.

(b) (i)



OR



B(ii). Calculate the volume of Oxygen that would be required for the complete combustion of 2.5 moles of ethanol at s.t.p [molar volume at s.t.p = 22.4dm³]

Answer: $C_2H_5OH(aq) + 3H_2O(l) + 2CO_2(g)$

From the above equation 1 mole of ethanol requires 3 x 22.4 dm³ of Oxygen

= 2.5mols = $2.5 \times 22.4 / 1 = 168.0 dm^3$.

C(i). Define esterification

Answer: This is the reaction between an alkanol and alkanoic acid to produce alkanoate /ester (and water in the presence of a mineral acid).

C(ii). Give two uses of Alkanoates

Answer: A. production of soap.

B. It is used in cosmetics.

C(iii). Give the products of the alkaline hydrolysis of ethyl ethanoate

Answer: Ethanol and Sodium ethanoate

D. A tin coated plate and a galvanized plate were exposed for the same length of time.

(i) which of the two plates corrodes faster?

Answer: Tin coated plate.

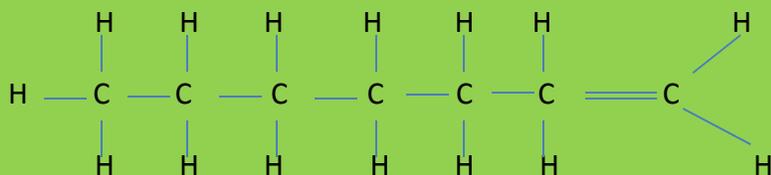
(ii) Explain briefly your answer in d(i)

Answer: Zinc is more reactive than tin. When the tin coated plate is exposed, the plate goes into solution. In zinc coated plate, it is the zinc that dissolves and hence protecting the plate better and zinc coated plate does not corrode.

QUESTION 3

A (i). Draw the structure of the sixth member of the alkenes.

Answer:



(ii). Calculate the relative molecular mass of the sixth member of the alkenes.

Answer; $\text{C}_7\text{H}_{14} = (14 \times 1) + (7 \times 12) = 14 + 84 = 98$

(iii). State one difference between cracking and reforming in the petroleum industry

Answer;

Cracking	Reforming
Used to increase quantity of Petrol	Used to improve the quality of petrol

B(i). Define the term enthalpy of neutralization.

Answer;

This is the heat evolved when an acid reacts with a base to form one mole of water, when one mole of H^+ from an acid reacts with one mole of OH^- from a base to form one mole of water.

(ii). Describe briefly how the enthalpy of neutralization of the reaction of dilute hydrochloric acid and aqueous potassium hydroxide could be determined.

Answer:

Equimolar solutions of hydrochloric acid and potassium hydroxide are prepared separately. A known volume of the acid is placed in a calorimeter and temperature is recorded. The same volume of the potassium hydroxide solution at the same temperature is poured into the calorimeter and stirred gently. The maximum temperature of the mixture is recorded.

Heat lost in the reaction = heat gain by the solution formed.

C. An electrochemical cell is constructed with copper and silver electrodes;

(i). State which of the electrodes will be the

1. Anode

2. Cathode

Answer:

1. Copper electrode

2. Silver

(ii). Give the reason for your answer in 3c(i)

Answer:

Silver has more positive standard electrode potential than copper. Copper is more electropositive than silver.

(iii). State the type of reaction occurring at each electrode

Answer:

Oxidation and Reduction

(iv). Write a balanced equation for the overall cell reaction.

Answer:



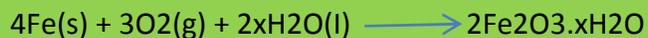
D(i). Name the compound formed when iron is exposed to moist air for a long time.

Answer:

Hydrated iron (III) oxide

(ii). Write a balanced chemical equation for the reaction in 3d(i)

Answer:



(iii). Name one ore of iron.

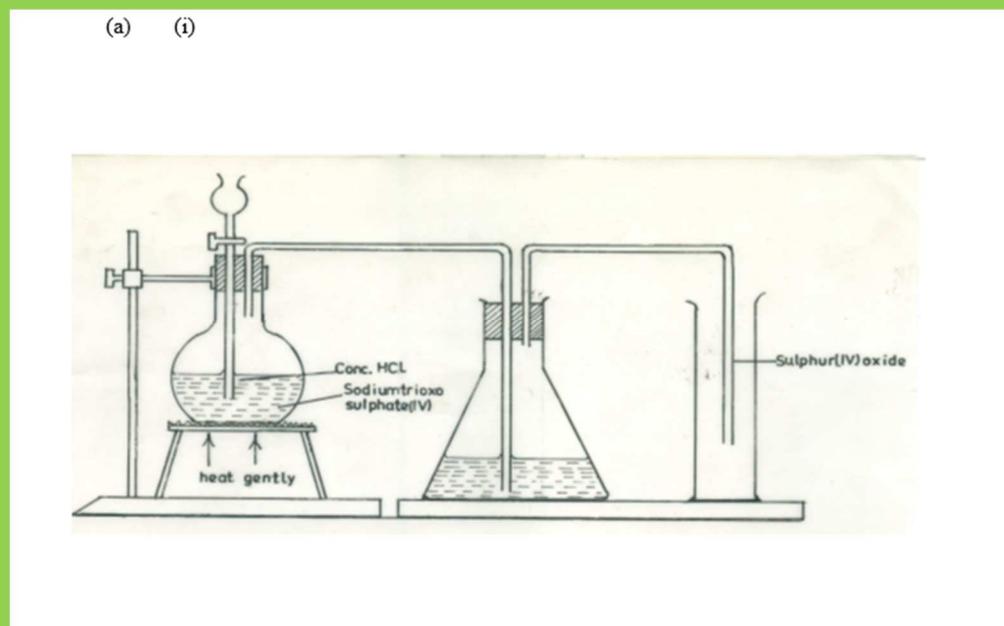
Answer:

Limonite, iron pyrites

QUESTION 4

A(i). Draw and label a diagram for the laboratory preparation of a dry sample of Sulphur(IV) oxide.

Answer:



(ii). Write a balanced chemical equation for the reaction in 4a(i)

Answer:



(iii). State the precaution that must be taken in the preparation of the gas stated in 4a(i)

Answer:

It should be prepared in a fume chamber.

(iv). Give a reason why precaution stated in 4a(iii) that must be taken.

Answer:

Because the gas is poisonous.

B (i). State Dalton's law of partial pressures.

Answer:

Dalton's law state for a mixture of gases which do not react, the total pressure is equal to the sum of the partial pressures of the individual gases.

(ii). The volume of a sample of Methane collected over water at a temperature of 120C and a pressure of 700mmHg was 30cm³. Calculate the volume of the dry gas at s.t.p (Saturated vapour pressure of water at 120C is mmHg

Answer:

$$P_1 V_1 = P_2 V_2$$

$$T_1 \quad T_2$$

$$P_1 = (700-10) = 690\text{mmHg}$$

$$T_1 = 12 + 273 = 285 \text{ K}$$

$$V_2 = \frac{P_1 V_1 T_1}{P_2 T_1}$$

$$= \frac{690 \times 30 \times 273}{760 \times 285}$$

$$= 26.09\text{cm}^3$$

C (i). Write an equation for the reaction between chlorine and water

Answer:



(ii). Why does litmus paper turn red when put in resulting solution in 4c(i)

Answer:

H⁺ ions are released, the solution/ HCl produced is acidic / HClO produced is acidic / solution is acidic.

D (i). State the trend in the boiling points of chlorine bromine and iodine.

Answer:

Boiling point of iodine is greater than that of bromine which is greater than that of chlorine.

(ii). Explain briefly why water has a higher boiling point than ammonia.

Answer:

Because water has stronger hydrogen bonds than ammonia because oxygen atom has two lone pairs of electrons and nitrogen atoms has one pair of electron.

QUESTION 5

A (i). State two industrial uses of hydrogen.

Answer:

1. Manufacture of plastics
2. Used in fuel cells

(ii). Consider the equation below;



(I). State the type of hardness of water being removed as shown by the above equation

Answer:

Temporary hardness of water.

(II). Give two disadvantages of hardness of water

Answer:

1. It is not suitable for use in tanning, textiles and paper production
2. Not suitable for laundry

B (i). In the extraction of aluminum by electrolysis, graphite electrode are used. State the disadvantages of using this type of electrode.

Answer:

At the high temperature oxygen gas produced at the anode reacts with the graphite electrodes to form Carbon (IV) oxide.

(ii). Calcium oxide reacts with water to form slaked lime;

1. Write a balanced equation for this reaction.

Answer



2. State one use of slaked lime.

Answer

1. Production of bleaching powder
2. To test for CO₂
3. Used to treat acidic soil

C (i). what is meant by saponification?

Answer

This is the process in which fat is boiled with alkali to produce soap (and propane- 1,2,3-triol)

(ii). List the raw material needed for the manufacture of soap

Answer

Fat and alkali (sodium hydroxide / potassium hydroxide)

(iii). Name the main by product obtained from the manufacture of soap.

Answer

Propane- 1, 2, 3- triol

D (i). With the aid of chemical equations, explain briefly how iron is extracted in the blast furnace using iron ore, coke and limestone as raw materials at the:

1. Bottom of the furnace

Answer:

The O₂ in the hot air combines with carbon (Coke) to produce carbon (IV) Oxide which is reduced to carbon (II) oxide. $C + O_2 \rightarrow CO_2$, $CO_2 + C \rightarrow 2CO$

2. Middle of the furnace

Answer:

The CaCO₃ decomposes under great heat to form CO₂ and CaO / CaCO₃ decomposes to remove the impurities / SiO₂



3. Top of the furnace

Answer:

Iron (III) oxide is reduced to metallic Iron. $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$