

ICSE SEMESTER 2 EXAMINATION

SAMPLE PAPER - 5

CHEMISTRY

(SCIENCE PAPER 2)

Maximum Marks: 40

Time allowed: One and a half hours

Answers to this Paper must be written on the paper provided separately.

You will not be allowed to write during the first 10 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

Attempt all questions from Section A and any three questions from Section B.

SECTION A

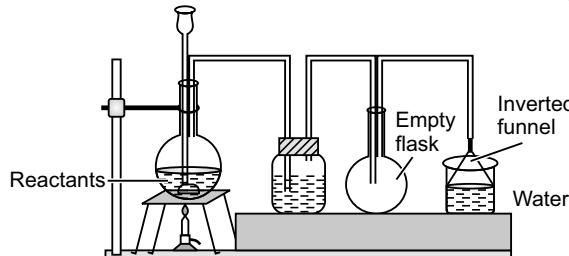
(Attempt all questions.)

Section-A (Attempt all questions)

Question 1.

Choose the correct answers to the questions from the given options. (Do not copy the question, write the correct answer only.)

(i) The product obtain at the end of the reaction, as shown in the following figure is:



(a) Sulphuric acid (c) Hydrochloric acid
(b) Nitric acid (d) Hydrogen chloride gas

(ii) The reaction taking place in the Haber's process is _____ reaction.
(a) Endothermic and irreversible (c) Exothermic and reversible
(b) Endothermic and reversible (d) Exothermic and irreversible

(iii) Reaction of copper with dil. and conc. nitric acid yields _____ and _____ gases respectively.
(a) NO and NO₂ (b) NO₂ and NO₃ (c) NO and NO₃ (d) NO and N₂

(iv) Pyrosulphuric acid is the chemical name of:
(a) Green vitriol (b) White vitriol (c) Oleum (d) Gypsum

(v) An unsaturated hydrocarbon having a triple covalent bond has 50 hydrogen atoms in its molecule. The number of "C" atoms in its molecule will be:
(a) 24 (b) 25 (c) 28 (d) 26

Section-B

Question 2.

(i) Define:

- Mineral
- Isomers

(ii) Name the compound formed when:

- The property to form long chains of atoms through chemical linkage among the atoms.
- A fertilizer made by combining ammonia and carbon dioxide.

(iii) Draw the structural diagram of:

- 2, 3-Dimethyl butane
- 2-Propanol
- 1-Propanol

(iv) Complete and balance the following chemical equations:

- $\text{C}_2\text{H}_4 + \text{H}_2 \rightarrow$
- $\text{S} + \text{HNO}_3 \xrightarrow{\Delta} \rightarrow$
- $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{SO}_4 \rightarrow$

Question 3.

(i) Identify the anion present in the following compounds :

- (a) Compound X on heating, with copper turnings and concentrated sulphuric acid liberates a reddish brown gas.
- (b) Compound L on reacting with barium chloride solution gives a white precipitate insoluble in dilute hydrochloric acid or dilute nitric acid.

(ii) Identify the gas evolved in each of the following cases :

- A colourless gas liberated on decomposition of nitric acid
- The gas released when sodium carbonate is added to a solution of sulphur dioxide.

(iii) State the observation for the following, when:

- Ethanol is heated with conc. H_2SO_4 at 170°C .
- Silver nitrate solution is added to dilute hydrochloric acid.
- Zinc sulphide is heated with dilute hydrochloric acid.

(iv) Write balanced equation for the following conversions:

- Ethane to ethyl chloride.
- Ferric hydroxide from ferric chloride.
- Ammonium nitrate from ammonia.

Question 4.

(i) State the relevant reason for the following:

- Hydrocarbons are excellent fuels. Give reason.
- The mixture of nitrogen and hydrogen gases entering the catalyst chamber must be pure. Why?

(ii) Name the metals which can be extracted from the following ores:

- Bauxite
- Haematite

(iii) Identify the terms for the following:

- An alloy used in the manufacturing of pressure cookers.
- An explosive formed when ammonia and chlorine react together.
- The first member of alkyne series.

(iv) The following questions are based on the preparation of ammonia gas in the laboratory:

- Name the compound normally used as a drying agent during the process.
- How is ammonia gas collected?
- Explain why it is not collected over water.

Question 5.

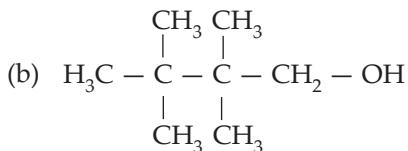
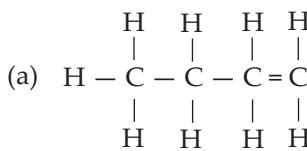
(i) Write the names and molecular formulas of following:

- Third member of homologous series of alkynes.
- Member of homologous series of alkenes having the molecular weight of 56

(ii) Select the correct answer from the brackets to complete the following statements:

- Ammonia gas is dried by using _____ during its laboratory preparation.
- Sodium carbonate on treatment with hydrochloric acid gives sodium chloride and _____ gas. (oxygen/carbon dioxide/carbon monoxide)

(iii) Give the IUPAC names of the following organic compound:



(iv) Write balanced chemical equation to show preparation of sulphuric acid using :

- (a) SO_3
- (b) conc. HNO_3
- (c) Cl_2

Question 6.

- (i) Distinguish between the following:
 - (a) Ethene and ethane [using potassium permanganate solution]
 - (b) Dilute HCl and dilute H_2SO_4 [using lead nitrate solution]
- (ii) Give one word for the following statements:
 - (a) The shape of methane molecule.
 - (b) The most common ore of aluminium.
- (iii) A, B, C and D summarize the properties of sulphuric acid depending on whether it is dilute or concentrated. Choose the property (A, B, C or D), depending on which is relevant to each of the preparations (a) to (c):
 - (A) Dilute acid (typical acid properties)
 - (B) Non-volatile acid.
 - (C) Oxidizing agent.
 - (D) Dehydrating agent
 - (a) Preparation of hydrogen chloride.
 - (b) Preparation of ethene from ethanol.
 - (c) Preparation of copper sulphate from copper oxide.
- (iv) (a) Write a balanced equation for the complete combustion of ethane.
(b) Name a solid which can be used instead of concentrated sulphuric acid to prepare ethylene by the dehydration of ethanol.
(c) Ethylene forms an addition product with chlorine. Name this addition product and write its structural formula.



Section-A

Answer 1.

(i) (c) Hydrochloric acid

Explanation :

This arrangement shows the production of HCl gas using sodium chloride and sulphuric acid. The gas so produced is then purified using conc. H_2SO_4 and then passes through an empty beaker. At last, passes through water which produces hydrochloric acid. Hence the end product is HCl acid.

(ii) (c) Exothermic and reversible

Explanation :

The reaction of nitrogen and hydrogen gas to produce ammonia is highly exothermic as it produces an enormous amount of heat. Also, it is reversible in nature. The reason is that some of the product, ammonia, converts back to the original reactants, nitrogen and hydrogen, under the reaction conditions. Since the reverse reaction occurs under the same conditions as the forward reaction, the reaction is reversible.

(iii) (a) NO and NO_2

Explanation :

Both dilute and concentrated nitric acid reacts with copper to give salt of copper nitrate and water. However, both of these acids produce different gases. Dilute nitric acid produces nitrous oxide, whereas concentrated nitric acid produces nitrogen dioxide.

(iv) (c) Oleum

Explanation :

Oleum is a common name of a compound having molecular formula $\text{H}_2\text{S}_2\text{O}_7$. This compound is also known as pyrosulphuric acid. It is produced during the manufacturing of sulphuric acid in the contact process.

(v) (d) 26

Explanation :

The compounds containing triple bond are known as alkynes and they have the general formula of $\text{C}_n\text{H}_{2n-2}$. Where, n is the number of atoms in one molecule. If the number of hydrogen atoms in its molecule is 50, then the number of carbon atoms should be 26 ($2n - 2 = 50$) therefore $n = 26$.

(vi) (c) CO_2 gas

Explanation :

In electrolytic reduction of alumina, oxygen is produced at anode. This oxygen oxidizes anode (which is made up of graphite) to initially give carbon monoxide, which when further combines with oxygen produces carbon dioxide gas.

(vii) (a) Lowers; pressure

Explanation :

The HCl gas present inside the flask, when mixed with water, lowers the pressure inside the flask as some gas molecules dissolve in water.

(viii) (b) Platinum is costly and can be easily poisoned

Explanation :

Platinum is an efficient catalyst, but it is costly and easily poisoned by arsenic oxide. V_2O_5 is an efficient catalyst and less expensive than platinum and hence is a suitable replacement for platinum.

(ix) (a) (1)-(iv), (2)-(iii), (3)-(i), (4)-(ii)

(x) (c) $\text{NO}_2 + \text{CO}_2 + \text{H}_2\text{O}$

Explanation :

Carbon reacts with concentrated nitric acid to give carbon dioxide, water and nitrogen dioxide gas. Due to the strong oxidising nature of nitric acid, it oxidises carbon to CO_2 . The reaction is given as



Section-B

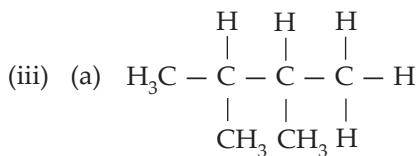
Answer 2.

(i) (a) The naturally occurring compounds of elements are known as mineral. It has a definite chemical composition and ordered atomic structure.

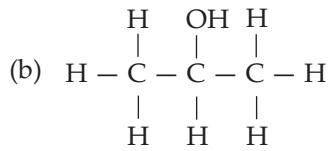
(b) Compounds having the same molecular formula, but different structural formula, are called 'isomers' of one another and this phenomenon is called 'isomerism'.

(ii) (a) Catenation

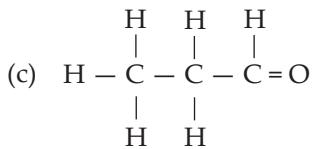
(b) Urea (NH_2CONH_2)



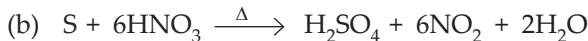
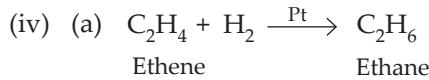
2, 3-Dimethyl butane



2-Propanol



1-Propanal

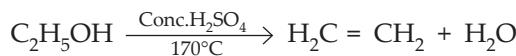


Answer 3.

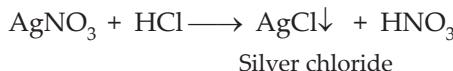
(i) (a) Nitrate ion, NO_3^-
(because reddish brown fumes are evolved with turns KI paper brown. This shows the presence of NO_3^- ion.)
(b) Sulphate ion, SO_4^{2-}
($\text{BaCl}_2 + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4 + 2 \text{Cl}^-$)

(ii) (a) Nitrogen dioxide ($4\text{HNO}_3 \rightarrow 2\text{H}_2\text{O} + 4\text{NO}_2 + \text{O}_2$)
(b) Carbon dioxide gas ($\text{Na}_2\text{CO}_3 + 2\text{SO}_2 + \text{H}_2\text{O} \rightarrow 2\text{NaHSO}_3 + \text{CO}_2$)

(iii) (a) When ethanol is heated with conc. H_2SO_4 at 170°C , it undergoes dehydration and forms ethene.



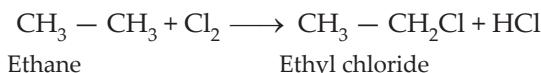
(b) When silver nitrate solution is added to dilute hydrochloric acid, an insoluble white precipitate of silver chloride is formed.



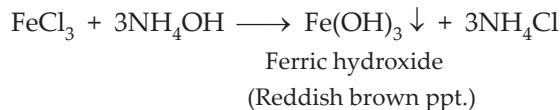
(c) When zinc sulphide is heated with dilute hydrochloric acid, a colourless hydrogen sulphide gas is evolved, which has a rotten egg smell.



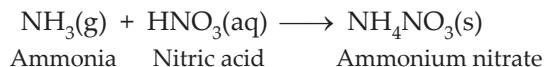
(iv) (a) When equal volumes of ethane and chlorine are exposed to diffused sunlight, they react to form ethyl chloride (monochloroethane).



(b) When an aqueous solution of ammonia is added to ferric chloride solution, a reddish brown precipitate of ferric hydroxide is produced which is insoluble even in the excess of ammonium hydroxide.



(c) Ammonia reacts with nitric acid to form ammonium nitrate.



Answer 4.

(i) (a) Hydrocarbons are excellent fuels because they ignite easily at low temperature and liberate large amount of heat without producing harmful products.

(b) The mixture of nitrogen and hydrogen gases entering the catalyst chamber must be pure, because the presence of carbon dioxide, carbon monoxide and traces of sulphur compound poisoned the catalyst. Therefore, the removal of these catalyst poison from nitrogen and hydrogen is very essential.

(ii) (a) Aluminium

(b) Iron

(iii) (a) Duralumin (alloy of 95% Al as steel, 4% Cu, 0.5% Mn and 0.5% Mg)

(b) Nitrogen trichloride ($\text{NH}_3 + 3\text{Cl}_2 \rightarrow 3\text{HCl} + \text{NCl}_3$)

(c) Acetylene (Ethyne) C_2H_2 .

(iv) (a) Quick lime. (CaO is a hydroscopic salt as it readily absorbs moisture)

(b) By downward displacement of air.

(c) It is highly soluble in water.

Answer 5.

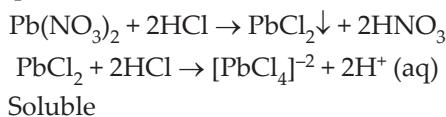
(i) (a) Butyne (Methyne is not possible, thus, first member is Ethyne, second member is Propyne and third member is Butyne. C_4H_6)
 (b) Butene, C_4H_8 (Molecular weight of C_4H_8 = $12 \times 4 + 1 \times 8$)
 $= 48 + 8$
 $= 56u$

(ii) (a) Quick lime
 (b) Carbon dioxide ($Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O$)
 (iii) (a) But-1-ene (c) But-2-yne
 (b) 2, 2, 3, 3-Tetramethyl butan-1-ol
 (iv) (a) $SO_3 + H_2O \rightarrow H_2SO_4$
 (b) $S + 6NHO_3 \xrightarrow{\Delta} H_2SO_4 + 6NO_2 + 2H_2O$
 (c) $SO_2 + 2H_2O + Cl_2 \rightarrow H_2SO_4 + 2HCl$

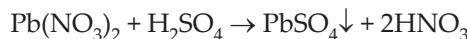
Answer 6.

(i) (a) When few drops of purple colour potassium permanganate is added to ethane, its purple colour does not fades but when a few drops of it is added to ethene, the solution decolourizes.

(b) Lead nitrate reacts with dilute HCl to form the insoluble salt lead chloride, which appears as the white precipitate. The insoluble lead chloride reacts with excess Cl^- ions (of HCl) to form a soluble complex, the tetrachloroplumbate(II) ion,



Lead nitrate solution reacts with H_2SO_4 to give lead sulphate, which does not dissolve further in sulphuric solution.



(ii) (a) Tetrahedral

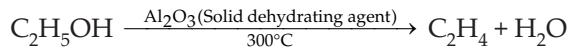
(b) Bauxite

(iii) (a) B (non-volatile acid).

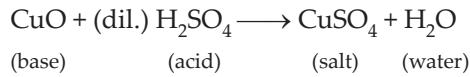


(Non-volatile acid)

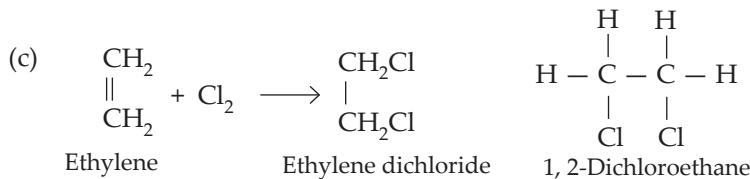
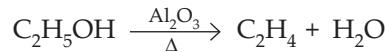
(b) D (dehydrating agent).



(c) A (dilute acid).



(b) Alumina (Al_2O_3).



□□