Date: 13/05/2022

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Time: 90 Min.

CHEMISTRY

Max. Marks: 40

ICSE Board Class X (Semester-2) Exams

Answers & Solutions (Science Paper 2)

GENERAL INSTRUCTIONS

- 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**.
- The marks intended for questions are given in brackets [ ].

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.) **[10×1=10]**

(i) The ore of Aluminium is:

(a) Calamine (b) Haematite

(c) Magnetite (d) Cryolite

Answer (d)

Sol. : Cryolite is Na_3AlF_6

(ii) Hydrogen chloride gas is **not** collected over water, as:

(a) It is highly soluble in water (b) It is less soluble in water

(c) It is lighter than air (d) It is heavier than air

Answer (a)

Sol. : Hydrogen chloride gas is not collected over water as it is highly soluble in water.

(iii) An aqueous solution of ammonia is:

(a) Neutral (b) Acidic

(c) Basic (d) Amphoteric

Answer (c)

Sol. : Aqueous solution of ammonia is ammonium hydroxide (NH_4OH).

(iv) The acid which is *least* volatile is:

(a) Hydrochloric acid (b) Nitric acid

(c) Dilute sulphuric acid (d) Concentrated sulphuric acid

Answer (d)

Sol. : Boiling point of concentrated H_2SO_4 is 338°C.

(v) The gas formed, when calcium bisulphite reacts with dilute HNO_3:

(a) Sulphur trioxide (b) Hydrogen

(c) Sulphur dioxide (d) Hydrogen sulphide

Answer (c)

Sol. : $Ca(HSO_3)_2 + 2HNO_3 \longrightarrow Ca(NO_3)_2 + 2H_2O + 2SO_2\uparrow$

(vi) The IUPAC name of formic acid:

(a) Propanoic acid (b) Methanoic acid

(c) Ethanoic acid (d) Butanoic acid

Answer (b)

Sol. : Methanoic acid – HCOOH

(vii) The metallic oxide which when reacts with HCl forms salt and water:

(a) Carbon monoxide (b) Nitrous oxide

(c) Ammonium hydroxide (d) Sodium oxide

Answer (d)

Sol. : $\underset{\text{(Metallic oxide)}}{Na_2O} + 2HCl \longrightarrow \underset{\text{(Salt)}}{2NaCl} + \underset{\text{(Water)}}{H_2O}$

(viii) Vanadium pentoxide is used as a *catalyst* in the preparation of:

(a) Nitrogen gas (b) Nitrogen dioxide gas

(c) Sulphur trioxide gas (d) Carbon dioxide gas

Answer (c)

Sol. : $2SO_2 + O_2 \underset{447^\circ C}{\overset{V_2O_5}{\rightleftharpoons}} 2SO_3$

(ix) The Catalyst used for the conversion of Ethene to Ethane:

(a) Iron (b) Nickel

(c) Cobalt (d) Molybdenum

Answer (b)

Sol. : $\underset{\text{Ethene}}{CH_2 = CH_2} \xrightarrow[+H_2]{\text{Ni catalyst}} \underset{\text{Ethane}}{CH_3 - CH_3}$

(x) *Substance* which helps to lower the fusion point of the mixture in Hall Heroult Process:

(a) Coke (b) Concentrated sodium hydroxide

(c) Fluorspar (d) Concentrated potassium hydroxide

Answer (c)

Sol. : In the Hall-Heroult's process, purified Al_2O_3 is mixed with Na_3AlF_6 (cryolite) or CaF_2 (fluorspar) which lowers the fusion point of the mixture and brings conductivity.

SECTION-B

*(Attempt **any three** questions from this Section)*

Question 2

(i) Define: **[2]**

(a) Isomerism

(b) Ores

(ii) Name the following: **[2]**

(a) The property by which carbon links with itself to form a long chain.

(b) The saturated hydrocarbons having general formula C_nH_{2n-2}.

(iii) Draw the structural diagram of : **[3]**

(a) pentanal

(b) propanol

(c) 2-butene

(iv) Complete and balance the following chemical equations : **[3]**

(a) $H_2C = CH_2 + Cl_2 \xrightarrow[\text{Inert solvent}]{CCl_4}$

(b) $C_2H_6 + O_2$ [excess] $\longrightarrow$

(c) $CH_4 + O_2$ [excess] $\longrightarrow$

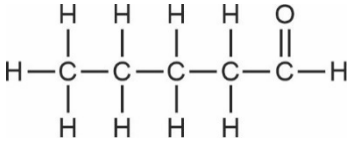
Solution :

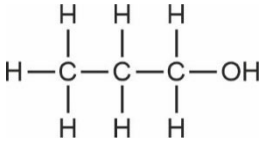
(i) (a) The property in which two or more compounds have the same molecular formula but different structural formulae and different properties is called "Isomerism". **[1]**

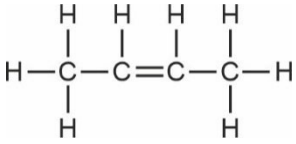
(b) The minerals from which the metals can be conveniently and economically extracted are known as "Ores". **[1]**

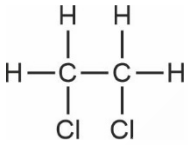
(ii) (a) Catenation **[1]**

(b) Alkynes **[1]**

(iii) (a)  **[1]**

(b)  **[1]**

(c)  **[1]**

(iv) (a) $H_2C = CH_2 + Cl_2 \xrightarrow[\text{Inert solvent}]{CCl_4}$  **[1]**

(b) $2C_2H_6 + 7O_2$ [excess] $\longrightarrow 4CO_2 + 6H_2O$ **[1]**

(c) $CH_4 + 2O_2$ [excess] $\longrightarrow CO_2 + 2H_2O$ **[1]**

Question 3

(i) State the following: **[2]**

(a) A compound formed when excess ammonia gas reacts with chlorine.

(b) A substance added to water, to manufacture sulphuric acid in Contact process.

(ii) Identify the gas **P** and **Q** in the reactions given below: **[2]**

(a) A compound reacts with an acid to form gas **P** which has no effect on acidified $K_2Cr_2O_7$ solution but turns lime water milky.

(b) A metallic nitrate reacts on heating gives oxygen gas along with a coloured gas **Q**.

(iii) State the **observation** for the following: **[3]**

(a) Dry ammonia gas reacts with oxygen in the presence of a catalyst.

(b) Excess chlorine gas reacts with ammonia gas.

(c) Carbon reacts with hot concentrated nitric acid.

(iv) Write **balanced equation** for the following conversions: **[3]**

(a) Carbon from cane sugar and concentrated sulphuric acid.

(b) Ferric nitrate from ferric hydroxide and nitric acid.

(c) Ammonium sulphate from ammonium hydroxide and sulphuric acid.

Solution :

(i) (a) NH_4Cl (Ammonium chloride) **[1]**

(b) $H_2S_2O_7$ (Oleum) **[1]**

(ii) (a) P = CO_2 (Carbon dioxide) **[1]**

(b) Q = NO_2 (Nitrogen dioxide) **[1]**

(iii) (a) When dry ammonia gas and oxygen are passed through different inlets over heated platinum at 800ºC in a combustion tube, a reddish glow is observed. **[1]**

$$4NH_3 + 5O_2 \xrightarrow{Pt,\ 800^\circ C} 4NO\uparrow + 6H_2O + Heat$$

(b) When excess chlorine gas reacts with ammonia gas, a highly explosive yellow coloured liquid substance nitrogen trichloride is formed along with HCl. **[1]**

$$NH_3 + \underset{(Excess)}{3Cl_2} \longrightarrow 3HCl + NCl_3$$

(c) Carbon is oxidised to carbon dioxide **[1]**

$$4HNO_3 + C \longrightarrow 2H_2O + 4NO_2 + CO_2$$

(iv) (a) $\underset{\text{Cane sugar}}{C_{12}H_{22}O_{11}(s)} \xrightarrow{Conc.\ H_2SO_4} \underset{\text{Sugar charcoal}}{12C(s)} + 11H_2O$ **[1]**

(b) $\underset{\text{Ferric hydroxide}}{Fe(OH)_3} + \underset{\text{Nitric acid}}{3HNO_3} \longrightarrow \underset{\text{Ferric nitrate}}{Fe(NO_3)_3} + 3H_2O$ **[1]**

(c) $\underset{\substack{\text{Ammonium}\\\text{hydroxide}}}{2NH_4OH} + \underset{\substack{\text{Sulphuric}\\\text{acid}}}{H_2SO_4} \longrightarrow \underset{\substack{\text{Ammonium}\\\text{sulphate}}}{(NH_4)_2SO_4} + 2H_2O$ **[1]**

Question 4

(i) State the **relevant reason** for the following: **[2]**

(a) Concentrated alkali is used for the concentration of bauxite ore.

(b) Fused alumina is reduced to aluminium by electrolysis.

(ii) State **one use** of the given alloys: **[2]**

(a) Magnalium

(b) Duralumin

(iii) Complete the table given below which refers to the Laboratory preparation of **Ammonia gas**: **[3]**

Laboratory preparation	Reactants used	Products formed	Drying agent	Method of collection
Ammonia gas	(a) _____	Calcium chloride + water + ammonia	(b) _____	(c) _____

(iv) Identify the term for the following : **[3]**

(a) The process used to purify Alumina by electrolytic reduction.

(b) The experiment used to demonstrate the high solubility of HCl gas.

(c) The chemical property of sulphuric acid to form two types of salts with an alkali.

Solution :

(i) (a) Concentrated alkali is used for the concentration of bauxite ore because it dissolves the ore (bauxite) particles while the undissolved impurities are left behind. **[1]**

(b) As fused alumina can not be reduced by carbon, carbon monoxide or hydrogen due to high reactivity of aluminium, it is reduced to aluminium by electrolysis. **[1]**

(ii) (a) Magnalium is used for making

- Machine parts
- Aircrafts
- Scientific instruments

(Any one) **[1]**

(b) Duralumin is used for making

- Aircrafts
- Pressure cookers
- Tools

(Any one) **[1]**

(iii)

Laboratory preparation	Reactants used	Products formed	Drying agent	Method of collection
Ammonia gas	(a) Ammonium chloride + Calcium hydroxide	Calcium chloride + Water + Ammonia	(b) Quick lime (CaO)	(c) Downward displacement of air

[3]

(iv) (a) Hall Heroult's Process **[1]**

(b) Fountain experiment **[1]**

(c) Dibasic acid **[1]**

Question 5

(i) Write the balanced chemical equation for the following: **[2]**

(a) Action of heat on manganese dioxide and concentrated hydrochloric acid.

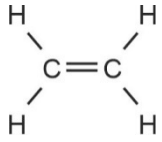
(b) Zinc reacts with dilute hydrochloric acid to form zinc chloride.

(ii) Select the right answer from the brackets and complete the statements: **[2]**

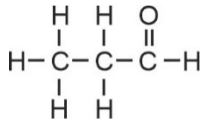
In electrolysis of fused Alumina, the anode is made of (a) _____ [gas carbon/graphite] and the product formed at cathode is (b) _____ [oxygen/ aluminium].

(iii) Give the IUPAC name for the following: **[3]**

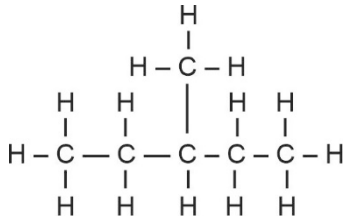
(a)



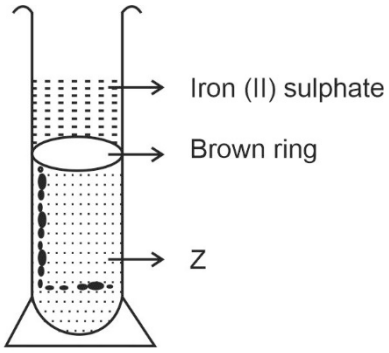
(b)



(c)



(iv) Study the diagram, which shows the Brown Ring Test and answer the questions given below: **[3]**



Brown Ring Test

(a) Which ion is determined by Brown Ring Test?

(b) Why is freshly prepared iron[II] sulphate used in the test?

(c) Name the substance Z.

Solution :

(i) (a) $MnO_2(s) + 4HCl(aq) \xrightarrow{\Delta} MnCl_2(aq) + Cl_2(g) + 2H_2O(l)$ **[1]**

(b) $Zn(s) + \underset{\text{dilute}}{2HCl(aq)} \longrightarrow ZnCl_2(aq) + H_2(g)$ **[1]**

(ii) (a) Graphite **[1]**

(b) Aluminium **[1]**

(iii) (a) Ethene **[1]**

(b) Propanal **[1]**

(c) 3–Methylpentane **[1]**

(iv) (a) Nitrate ion **[1]**

(b) A freshly prepared aqueous ferrous sulphate solution is used because on exposure to atmosphere it oxidises to ferric sulphate which does not give the brown ring test. **[1]**

(c) Concentrated H_2SO_4 **[1]**

Question 6

(i) Distinguish between the following as directed: **[2]**

(a) Sodium sulphite solution and sodium sulphate solution.

[Using dilute H_2SO_4]

(b) Lead salt solution and zinc salt solution.

[Using NH_4OH solution in excess]

(ii) Give one word for the following statement: **[2]**

(a) The compounds of various metals found in nature with earthly impurities.

(b) A homogeneous mixture of two or more metals or a metal and a non-metal in specific ratios.

(iii) Identify **the acid** in each case : **[3]**

(a) The acid formed when Sulphur reacts with concentrated nitric acid.

(b) An acid, which on adding to lead nitrate solution produces a white precipitate which is soluble on heating.

(c) The acid formed when potassium nitrate reacts with a least volatile acid.

(iv) Match column A with column B : **[3]**

Name (A)	Functional group (B)
1. Aldehyde	(a) –OH
2. Carboxylic acids	(b) –CHO
3. Alcohol	(c) –COOH

Solution :

(i)

	Reagent Used	Solutions to be distinguished		
		Sodium sulphite	Sodium sulphate	
(a)	Dilute H_2SO_4	Evolution of a gas which smells like burning sulphur	No reaction will be observed	**[1]**
		Lead salt solution	Zinc salt solution	
(b)	NH_4OH solution in excess	A chalky white precipitate of $Pb(OH)_2$ is obtained which is insoluble in excess of NH_4OH	A white gelatinous precipitate of $Zn(OH)_2$ is obtained which is soluble in excess of NH_4OH	**[1]**

(ii) (a) Minerals **[1]**

(b) Alloys **[1]**

(iii) (a) Sulphuric acid (H_2SO_4) **[1]**

(b) Sulphuric acid (H_2SO_4) **[1]**

(c) Nitric acid (HNO_3) **[1]**

(iv)

Name (A)	**Functional group (B)**	
1. Aldehyde	(b) –CHO	**[1]**
2. Carboxylic acids	(c) –COOH	**[1]**
3. Alcohol	(a) –OH	**[1]**

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