

# ICSE Solved Paper 2022 Semester-2

## Chemistry

### Class-X

(Maximum Marks : 40)

(Time allowed : One and one half hours)

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

This time is to be spent in reading the Question Paper.

All Questions are Compulsory

The intended marks for questions or parts of questions are given in brackets [ ].

#### SECTION-A

(10 marks)

(Attempt all questions)

1. Choose the correct answers to the questions from the given options. (Do not copy the question. Write the correct answer only.) [10]
- (i) The ore of Aluminium is:  
(a) Calamine (b) Haematite  
(c) Magnetite (d) Cryolite
- (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.
- (iii) An aqueous solution of ammonia is:  
(a) Neutral (b) Acidic  
(c) Basic (d) Amphoteric
- (iv) The acid which is least volatile is:  
(a) Hydrochloric acid  
(b) Nitric acid  
(c) Dilute sulphuric acid  
(d) Concentrated sulphuric acid
- (v) The gas formed, when calcium bisulphite reacts with dilute  $\text{HNO}_3$ :  
(a) Sulphur trioxide (b) Hydrogen  
(c) Sulphur dioxide (d) Hydrogen sulphide
- (vi) The IUPAC name of formic acid:  
(a) Propanoic acid (b) Methanoic acid  
(c) Ethanoic acid (d) Butanoic acid
- (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
- (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
- (ix) The catalyst used for the conversion of ethene to ethane:  
(a) Iron (b) Nickel  
(c) Cobalt (d) Molybdenum
- (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
- Ans. (i) Option (d) is correct.  
(ii) Option (a) is correct.  
(iii) Option (c) is correct.  
(iv) Option (d) is correct.  
(v) Option (c) is correct.  
(vi) Option (b) is correct.  
(vii) Option (c) is correct.  
(viii) Option (c) is correct  
(ix) Option (b) is correct  
(x) Option (c) is correct

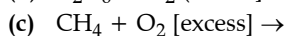
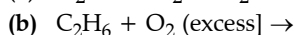
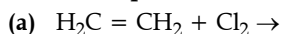
#### SECTION-B

(30 marks)

(Attempt any three questions from this section)

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 unsaturated hydrocarbons having general formula  $\text{C}_n\text{H}_{2n-2}$ .
- (iii) Draw the structural diagram of: [3]  
(a) pentanal  
(b) propanol  
(c) 2-butene

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



Ans. (i) (a) **Isomerism:** Those substances which have the same molecular formula but different structural formula within a molecule or substances having a similar number of atoms but differ in their physical and chemical properties is called isomerism.

(b) **Ores:** A naturally occurring mineral having a high concentration of a certain element is called an ore.

(ii) (a) Catenation

(b) Alkyne

(iii) (a)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$

(b)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

(c)  $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$

(iv) (a)  $\text{CH}_2 = \text{CH}_2 + \text{Cl}_2 \longrightarrow \text{CH}_2(\text{Cl}) - \text{CH}_2(\text{Cl})$

(b)  $2\text{C}_2\text{H}_6 + 7\text{O}_2 \text{ [excess]} \longrightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$

(c)  $\text{CH}_4 + 2\text{O}_2 \text{ [excess]} \longrightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

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  $\text{K}_2\text{Cr}_2\text{O}_7$  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 ammonia gas reacts with Chlorine.

(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.

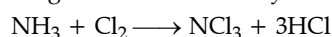
(b) Ferric nitrate from ferric hydroxide and nitric acid.

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

(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) .....

Ans. (i) (a) When excess ammonia gas reacts with chlorine a vigorous reaction takes place and produces hazardous compounds such as nitrogen trichloride and hydrochloric acid.

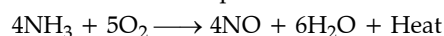


(b) A substance added to water in the Contact process is Oleum ( $\text{H}_2\text{S}_2\text{O}_7$ ) as Sulphur trioxide when reacts with sulphuric acid forms oleum since it is a highly exothermic reaction. The catalyst used is Vanadium oxide.

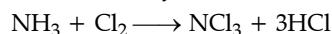
(ii) (a) P is metal carbonates or metal bicarbonates which react with an acid to form metal sulphate, water and carbon dioxide which has no effect on acidified potassium dichromate but turns lime water milky.

(b) Q is Nitrogen dioxide ( $\text{NO}_2$ ) is a coloured gas liberated when metal nitrate reacts on heating giving oxygen a coloured gas that is nitrogen gas.

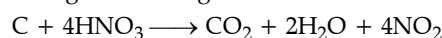
(iii) (a) Dry ammonia gas when reacts with oxygen in presence of a catalyst platinum form nitric oxide and water vapour.



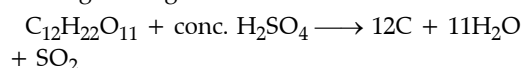
(b) When excess ammonia gas reacts with chlorine a vigorous reaction takes place and produces hazardous compounds such as nitrogen trichloride and hydrochloric acid.



(c) When concentrated hot nitric acid reacts with the carbon atom to form carbon dioxide gas, nitrogen dioxide gas and water.



(iv) (a) Reaction of cane sugar with conc. sulphuric acid gives sugar charcoal.



(b)  $\text{Fe}(\text{OH})_3 + 3\text{HNO}_3 \longrightarrow \text{Fe}(\text{NO}_3)_3 + 3\text{H}_2\text{O}$

(c)  $\text{NH}_4\text{OH} + \text{H}_2\text{SO}_4 \longrightarrow (\text{NH}_4)_2\text{SO}_4 + \text{H}_2\text{O}$

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

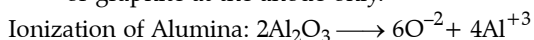
(b) Duralumin

(iv) Identify the terms for the following: [3]

- The process used to purify Alumina by electrolytic reduction.
- The experiment used to demonstrate the high solubility of HCl gas.
- The chemical property of sulphuric acid to form two types of salts with an alkali.

Ans.(i) (a) Concentrated alkali is used for the concentration of bauxite ore because it is soluble only in hot concentrated sodium hydroxide (NaOH) solution. Thus, impurities can be easily filtered out as they are insoluble in nature. This process of removing impurities is called leaching.

(b) Fused Alumina is reduced to aluminum by electrolysis because alumina is highly stable. Thus, aluminium is obtained at the cathode and oxygen at the anode and also solid carbon or graphite at the anode only.



(ii) (b) **Duralumin:** It is an alloy of aluminium and copper used in making parts for aircraft, trucks, rivets, etc.

(iii) (a) Ammonium chloride ( $NH_4Cl$ ) and Calcium hydroxide ( $Ca(OH)_2$ ).

(b) Calcium oxide( $CaO$ ).

(c) Method used for the collection of ammonia gas is downward displacement of air or in an inverted funnel because ammonia gas is soluble and lighter than air.

(iv) (a) Hall-Heroult process or Hoopé's process is used to purify Alumina by electrolytic reduction.

(b) Fountain experiment is used to demonstrate the extreme solubility of hydrochloric acid.

(c) Dibasic property of sulphuric acid is used to form two types of salts with an alkali.

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

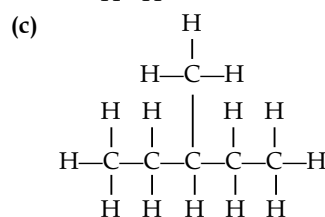
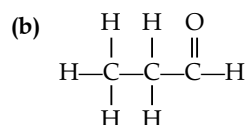
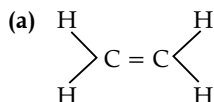
(a) Action of heat on manganese dioxide and concentrated hydrochloric acid.

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

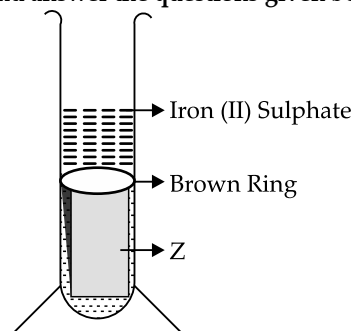
(ii) Select the right answer from the brackets and complete the statements: [2]

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]



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



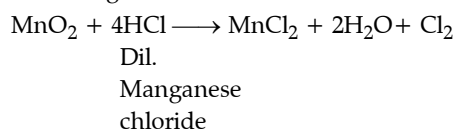
**Brown Ring Test**

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

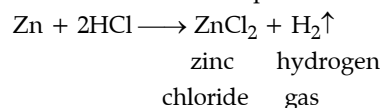
(b) Why is freshly prepared iron[II] sulphate used in the test?

(c) Name the substance Z.

Ans. (i) (a) When manganese dioxide reacts with concentrated hydrochloric acid forms Manganese chloride and water.

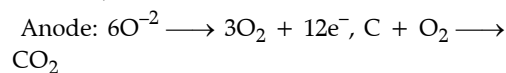
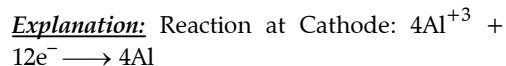


(b) When zinc reacts with dilute hydrochloric acid forms zinc chloride and releases hydrogen gas. This reaction is called displacement reaction,



(ii) (a) graphite

(b) aluminium



(iii) (a) Ethene

(b) Propanaldehyde

(c) 3-methyl pentane

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 statements:[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

Ans. (i) (a)

Sodium Sulphite	Sodium Sulphate
Sodium Sulphite ( $Na_2SO_3$ ) is an inorganic salt of sulphurous acid	Sodium Sulphate ( $Na_2SO_4$ ) is an inorganic salt of sulphuric acid.
It gives an effervescence when reacts with dilute acids due to the release of a colourless choking gas sulphur dioxide, which when further treated with acidified dichromate solution gives green colour.	When sodium sulphate reacts with dilute sulphuric acid, no reaction will take places as an acid do not react with its own salt due to the presence of same anion.

When sodium sulphite reacts with dil. $H_2SO_4$ liberates $SO_2$ gas. $Na_2SO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O + SO_2$	When sodium sulphate reacts with dil. sulphuric acid, it will simply dissolve and form a clear solution.
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(b)

S. No.	Lead salt solution	Zinc salt solution
(a)	A white insoluble precipitate will form when lead salt reacts with $NH_4OH$ is taken in excess.	A gelatinous white precipitate will form when zinc salt reacts with $NH_4OH$ is taken in excess.
(b)	$PbCO_3 + NH_4OH \longrightarrow Pb(OH)_2 \uparrow + 2NH_4NO_3$ (excess) white ppt.	$ZnCO_3 + NH_4OH \longrightarrow Zn(OH)_2 \downarrow + 2NH_4CO_3$ (excess) gelatinous ppt.

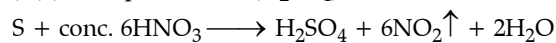
(ii) (a) Minerals

*Explanation:* Thus, minerals are those substances that are found on earth and formed naturally by various geological processes with certain earthly impurities.

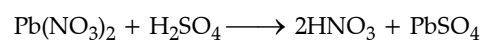
(b) Alloys

*Explanation:* Thus, alloys are the homogeneous mixture of metal and a non-metal or any two or more metals in a specific ratio. For example, steel, bronze, etc.

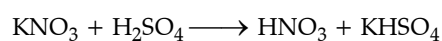
(iii) (a) Sulphuric acid ( $H_2SO_4$ )



(b) Sulphuric acid ( $H_2SO_4$ )



(c) Nitric acid ( $HNO_3$ )



(iv) 1. Aldehyde – (b) —CHO

2. Carboxylic acids – (c) —COOH

3. Alcohol – (a) —OH

