

# ICSE Solved Paper 2019

## Chemistry

### Class-X

(Maximum Marks : 80)

(Time allowed : Two hours)

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

You will **not** be allowed to write during the first 15 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.

**Section I** is compulsory. Attempt **any four** questions from **Section II**.

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

#### SECTION-I

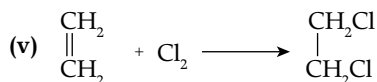
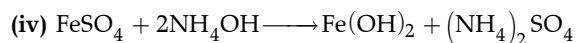
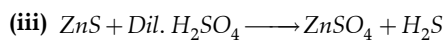
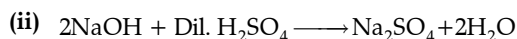
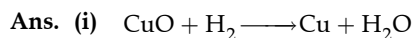
(40 marks)

Attempt all questions from this section

1. (a) Choose the correct answer from the options given below: [5]
- (i) An *electrolyte* which completely dissociates into ions is:
- (a) Alcohol
  - (b) Carbonic acid
  - (c) Sucrose
  - (d) Sodium hydroxide
- (ii) The most *electronegative* element from the following elements is:
- (a) Magnesium
  - (b) Chlorine
  - (c) Aluminium
  - (d) Sulphur
- (iii) The reason for using *Aluminium* in the alloy *duralumin* is:
- (a) Aluminium is brittle.
  - (b) Aluminium gives strength.
  - (c) Aluminium brings lightness.
  - (d) Aluminium lowers melting point.
- (iv) The *drying agent* used to *dry HCl* gas is:
- (a)  $\text{Con(c) H}_2\text{SO}_4$
  - (b)  $\text{ZnO}$
  - (c)  $\text{Al}_2\text{O}_3$
  - (d)  $\text{CaO}$
- (v) A hydrocarbon which is a *greenhouse* gas is:
- (a) Acetylene
  - (b) Ethylene
  - (c) Ethane
  - (d) Methane
- (iv) Option (a) is correct
- (v) Option (d) is correct
- (b) Fill in the blanks with the choices given in brackets: [5]
- (i) Conversion of *ethanol* to *ethene* by the action of *concentrated sulphuric acid* is an example of \_\_\_\_\_. (dehydration/dehydrogenation/dehydrohalogenation).
- (ii) When *sodium chloride* is heated with *concentrated sulphuric acid* below  $200^\circ\text{C}$ , one of the products formed is \_\_\_\_\_. (sodium hydrogen sulphate/sodium sulphate/chlorine).
- (iii) *Ammonia* reacts with *excess chlorine* to form \_\_\_\_\_. (nitrogen/nitrogen trichloride/ammonium chloride).
- (iv) *Substitution reactions* are characteristic reactions of \_\_\_\_\_. (alkynes/alkenes/alkanes).
- (v) In *Period 3*, the *most metallic* element is \_\_\_\_\_. (sodium/magnesium/aluminium).

- Ans. (i) Option (d) is correct
- (ii) Option (b) is correct
- (iii) Option (c) is correct

- Ans. (i) Dehydration
- (ii) Sodium hydrogen sulphate
- (iii) Nitrogen trichloride
- (iv) alkanes
- (v) sodium
- (c) Write a balanced chemical equation for each of the following reactions: [5]
- (i) Reduction of copper (II) oxide by hydrogen.
- (ii) Action of dilute sulphuric acid on sodium hydroxide.
- (iii) Action of dilute sulphuric acid on zinc sulphide.
- (iv) Ammonium hydroxide is added to ferrous sulphate solution.
- (v) Chlorine gas is reacted with ethene.



(d) State one observation for each of the following: [5]

(i) Concentrated nitric acid is reacted with sulphur.

(ii) Ammonia gas is passed over heated copper (II) oxide.

(iii) Copper sulphate solution is electrolysed using copper electrodes.

(iv) A small piece of zinc is added to dilute hydrochloric acid.

(v) Lead nitrate is heated strongly in a test tube.

Ans. (i) Sulphur is oxidised into sulphuric acid.

(ii) Pinkish red copper is obtained.

(iii) Reddish brown copper layer gets deposited at the cathode.

(iv) Hydrogen gas is evolved.

(v) Oxygen is produced.

(e) (i) Calculate: [5]

1. The number of moles in 12 g of oxygen gas [O=16]

2. The weight of  $10^{22}$  atoms of carbon. [C=12, Avogadro's No. =  $6 \times 10^{23}$ ]

(ii) Molecular formula of a compound is  $\text{C}_6\text{H}_{18}\text{O}_3$ . Find its empirical formula.

Ans. (i) 1. Mass of oxygen = 12 g

Molecular mass of  $\text{O}_2 = 16 \times 2 = 32$

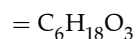
$$\therefore \text{Number of moles} = \frac{\text{Mass of oxygen}}{\text{Molecular mass of } \text{O}_2} = \frac{12}{32}$$

$$= 0.375 \text{ moles}$$

2. Weight of  $6 \times 10^{23}$  atom of carbon = 12 g

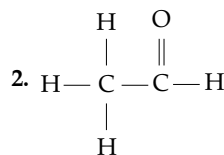
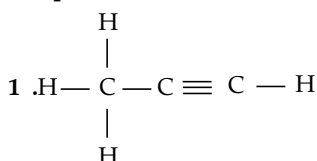
$$\therefore \text{Weight of } 10^{22} \text{ atom of carbon} = \frac{12 \times 10^{22}}{6 \times 10^{23}} = 0.2 \text{ g}$$

(ii) Molecular formula of compound



$\therefore$  Empirical formula =  $\text{C}_2\text{H}_6\text{O}$

(f) (i) Give the IUPAC name of the following organic compounds: [5]

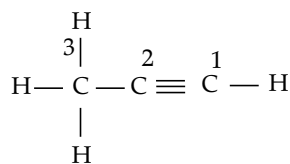


(ii) What is the special feature of the structure of ethyne?

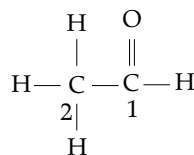
(iii) Name the saturated hydrocarbon containing two carbon atoms.

(iv) Give the structural formula of Acetic acid.

Ans. (i) 1.



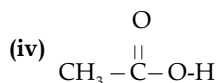
IUPAC name : Propyne



IUPAC name : Ethanal

(ii) Triple bond between carbon atoms.

(iii) Ethane



(g) Give the appropriate term defined by the statements given below: [5]

(i) The formula that represents the simplest ratio of the various elements present in one molecule of the compound.

(ii) The substance that releases hydronium ion as the only positive ion when dissolved in water.

(iii) The tendency of an atom to attract electrons towards itself when combined in a covalent compound.

(iv) The process by which certain ores, specially carbonates, are converted to oxides in the absence of air.

(v) The bond in which the electrons are shared equally between the combining atoms.

Ans. (i) Empirical formula

(ii) Acid

(iii) Electronegativity

(iv) Calcination

(v) Covalent bond

(h) Arrange the following according to the instructions given in brackets: [5]

(i) K, Pb, Ca, Zn (In the increasing order of the reactivity)

(ii)  $\text{Mg}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Na}^+$ ,  $\text{H}^+$  (In the order of preferential discharge at the cathode)



- (i) Manganese dioxide and copper (II) oxide. (using concentrated HCl)  
 (ii) Ferrous sulphate solution and ferric sulphate solution. (using sodium hydroxide solution)  
 (iii) Dilute hydrochloric acid and dilute sulphuric acid. (using lead nitrate solution)

(c) Choose the method of preparation of the following salts, from the methods given in the list: [4]

[List: A. Neutralisation B. Precipitation  
 C. Direct combination D. Substitution]

- (i) Lead chloride  
 (ii) Iron (II) sulphate  
 (iii) Sodium nitrate  
 (iv) Iron (III) chloride

- Ans. (a) (i) Ions are present in strong electrolyte.  
 (ii) Molecules are present in non-electrolyte.  
 (iii) Both ions and molecules are present in weak electrolyte.

(b)

(i)	<b>Manganese dioxide</b>	<b>Copper (II) oxide</b>
	Chlorine gas is evolved by using conc. HCl.	Chlorine gas is not evolved by using conc. HCl. [1]
(ii)	<b>Ferrous sulphate solution</b>	<b>Ferric sulphate solution</b>
	Dirty green precipitate of Fe(OH) <sub>2</sub> is produced by using sodium hydroxide solution.	Reddish brown precipitate of Fe(OH) <sub>3</sub> is produced by using sodium hydroxide solution. [1]
(iii)	<b>Dilute hydrochloric acid</b>	<b>Dilute sulphuric acid</b>
	Precipitate of lead chloride is formed which gets dissolved in excess of dil. HCl (by using lead nitrate solution)	White precipitate of PbSO <sub>4</sub> is formed which does not dissolve in excess of dil H <sub>2</sub> SO <sub>4</sub> (by using lead nitrate solution). [1]

(c)

	Salt		Method of preparation
(i)	Lead chloride	(B)	Precipitation [1]
(ii)	Iron(I) sulphate	(D)	Substitution [1]
(iii)	Sodium nitrate	(A)	Neutralisation [1]
(iv)	Iro(III) chloride	(C)	Direct combination [1]

4.(a) Complete the following equations: [3]

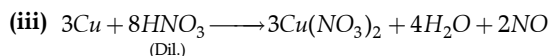
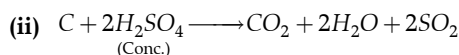
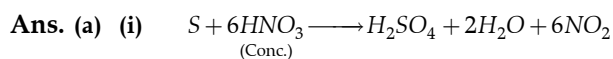
- (i) S + conc. HNO<sub>3</sub>  
 (ii) C + conc. H<sub>2</sub>SO<sub>4</sub>  
 (iii) Cu + dil. HNO<sub>3</sub>

(b) Write the balanced chemical equation for the preparation of: [3]

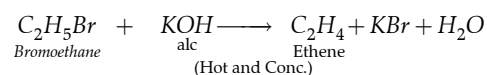
- (i) Ethene from bromoethane  
 (ii) Ethyne using calcium carbide  
 (iii) Methane from sodium acetate.

(c) Name the following organic compounds: [4]

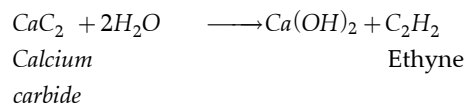
- (i) The compound with 3 carbon atoms whose functional group is a carboxyl.  
 (ii) The first homologue whose general formula is C<sub>n</sub>H<sub>2n</sub>.  
 (iii) The compound that reacts with acetic acid to form ethyl ethanoate.  
 (iv) The compound formed by complete chlorination of ethyne.



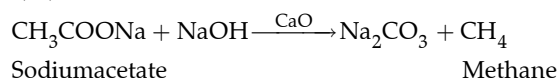
(b) (i) Ethene from bromoethane



(ii) Ethyne using calcium carbide



(iii) Methane from sodium acetate



(c) (i) Propanoic acid (CH<sub>3</sub>CH<sub>2</sub>COOH)

(ii) Ethene (C<sub>2</sub>H<sub>4</sub>)

(iii) Ethanol (C<sub>2</sub>H<sub>5</sub>OH)

(iv) Acetylene tetrachloride  $\begin{pmatrix} CHCl_2 \\ | \\ CHCl_2 \end{pmatrix}$

5. (a) Give the chemical formula of:

(i) Bauxite (ii) Cryolite

(iii) Sodium aluminate

(b) Answer the following questions based on the extraction of aluminium from alumina by Hall-Heroult's Process: [3]

(i) What is the function of cryolite used along with alumina as the electrolyte?

(ii) Why is powdered coke sprinkled in top of electrolyte?

(iii) Name the electrode, from which aluminium is collected.

(c) Match the alloys given in column I to the uses given in column II. [4]

COLUMN I	COLUMN II
(i) Duralumin	A. Electrical fuse
(ii) Solder	B. Surgical instruments
(iii) Brass	C. Aircraft body
(iv) Stainless Steel	E. Decorative articles

- Ans. (a) (i) Bauxite  $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$   
 (ii) Cryolite  $\text{Na}_3\text{AlF}_6$   
 (iii) Sodium aluminate  $\text{NaAlO}_2$
- (b) (i) Cryolite lowers the melting point of the ore and make it more conductive in nature.  
 (ii) Powdered coke is used to prevent heat loss from the molten electrolyte.  
 (iii) Aluminium is collected at cathode.
- (c)

Column I	Column II
(i) Duralumin	C. Aircraft body
(ii) Solder	A. Electrical fuse
(iii) Brass	D. Decorative articles
(iv) Stainless steel	B. Surgical instruments

6. (a) Identify the substances underlined: [3]  
 (i) The catalyst used to oxidise ammonia.  
 (ii) The organic compound which when solidified, forms an ice like mass.  
 (iii) The dilute acid which is an oxidising agent.
- (b) Copper sulphate solution reacts with sodium hydroxide solution to form a precipitate of copper hydroxide according to the equation: [3]

(c)

Element	Percentage	Atomic mass	Atomic ratio	Simplest ratio
C	75.92	12	$\frac{75.92}{12} = 6.32$	$\frac{6.32}{1.27} = 5$
H	6.32	1	$\frac{6.32}{1} = 6.32$	$\frac{6.32}{1.27} = 5$
N	17.76	14	$\frac{17.76}{14} = 1.27$	$\frac{1.27}{1.27} = 1$

Empirical formula =  $\text{C}_5\text{H}_5\text{N}$

Empirical formula mass =  $12(5) + 1(5) + 14 = 79$

Vapour density = 39.5

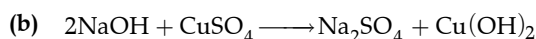
$$n = \frac{2 \times \text{Vapour density}}{\text{Empirical formula mass}} = \frac{2 \times 39.5}{79} = 1$$

$$\begin{aligned} \therefore \text{Molecular formula} &= \text{Empirical formula} \times n \\ &= \text{C}_5\text{H}_5\text{N} \times 1 \\ &= \text{C}_5\text{H}_5\text{N} \end{aligned}$$

7. (a) Name the gas evolved in each of the following cases: [3]  
 (i) Alumina undergoes electrolytic reduction.  
 (ii) Ethene undergoes hydrogenation reaction.  
 (iii) Ammonia reacts with heated copper oxide.
- (b) Study the flow chart given and give balanced equations to represent the reactions A, B and C: [3]

- (i) What mass of copper hydroxide is precipitated by using 200 gm of sodium hydroxide?  
 [H = 1, O = 16, Na = 23, S = 32, Cu = 64]  
 (ii) What is the colour of the precipitate formed?  
 (c) Find the empirical formula and molecular formula of an organic compound from the data given below:  
 C = 75.92%, H = 6.32% and N = 17.76%  
 The vapour density of the compound is 39.5.  
 [C = 12, H = 1, N = 14]

- Ans. (a) (i) Platinum (Pt)  
 (ii) Acetic acid ( $\text{CH}_3\text{COOH}$ )  
 (iii) Dil.  $\text{HNO}_3$  (Nitric acid)



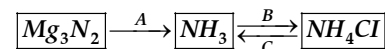
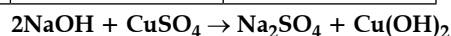
(i) Molecular mass of  $\text{Cu}(\text{OH})_2 = 64 + 16(2) + 1(2) = 98$

Molecular mass of  $\text{NaOH} = 23 + 16 + 1 = 40$

$\therefore$  80 g of sodium hydroxide forms = 98 g of  $\text{Cu}(\text{OH})_2$

$\therefore$  200 g of sodium hydroxide will form =  $\frac{98 \times 200}{80} = 245$  g of  $\text{Cu}(\text{OH})_2$

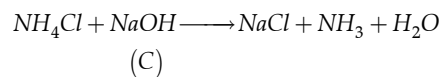
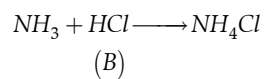
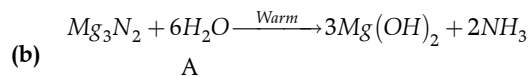
- (ii) Pale blue coloured precipitate of  $\text{Cu}(\text{OH})_2$  is formed.



- (c) Copy and complete the following table which refers to the industrial method for the preparation of ammonia and sulphuric acid: [4]

Name of the compound	Name of the process	Catalytic equation (with the catalyst)
Ammonia	(i) _____	(ii) _____
Sulphuric acid	(iii) _____	(iv) _____

- Ans. (a)(i) Oxygen  
 (ii) Ethane  
 (iii) Nitrogen



(c)

Name of the compound	Name of the process	Catalytic equation (with the catalyst)
Ammonia	(i) Haber's process	<p><i>Finely divided</i></p> <p>(ii) <math>N_2 + 3H_2 \xrightarrow[\text{Mo}]{\text{iron}} 2NH_3 + \text{Heat}</math></p> <p><b>(Catalyst = Finely divided iron)</b></p>
Sulphuric acid	(iii) Contact process	<p>(iv) <math>2SO_2 + O_2 \xrightarrow[450^\circ C]{V_2O_5} 2SO_3</math></p> <p><math>SO_3 + H_2SO_4 \longrightarrow H_2S_2O_7</math> (Conc.)</p> <p><math>H_2S_2O_7 + H_2O \longrightarrow 2H_2SO_4</math> (Conc.)</p> <p><b>(Catalyst = vanadium pentoxide)</b></p>

