MARKING SCHEME OF MODEL PAPER CHEMISTRY CLASS 10

NOTE: Attempt all questions of Section-A by filling the corresponding bubble on the **MCQs RESPONSE SHEET.** It is mandatory to return the attempted MCQs sheet to the Superintended within given time.

SECTION –A

Time: 20 Minutes   **Marks:** 12

1. The reaction which proceeds in both directions is called:

    A. **Reversible**

    B. Irreversible

    C. Spontaneous

    D. Non-Spontaneous

2. pH value less than 7 indicates the solution is:

    A. **Acidic**

    B. Basic

    C. Neutral

    D. No effect

3. Which of the following is the simplest member of organic compound?

    A. Formic Acid

    B. Formaldehyde

    C. **Methane**

    D. Methanol

4. In alkanes the carbon atoms are linked together by:

    A. **Single covalent bond**

    B. Double covalent bond

    C. Triple covalent bond

    D. Co-ordinate covalent bond

5. What is the physical state of first four alkanes?

    A. Solid

    B. Liquid

    C. **Gas**

    D. Plasma

6. The molecular formula of fructose is:

    A. **$C_6H_{12}O_6$**

    B. $C_7H_{44}O_7$

    C. $C_{12}H_{22}O_{11}$

    D. $C_{18}H_{32}O_{16}$

7. The temperature of thermosphere is up to:

A. -60 to $900°C$

B. -70 to $1000°C$

C. -80 to $1100°C$

D. **-90 to 1200**$°C$

8. Ozone is the allotropic form of:

A. Osmium

B. **Oxygen**

C. Argon

D. Oganesson

9. Which type of Hepatitis spreads through polluted water?

A. **Hepatitis A**

B. Hepatitis B

C. Hepatitis C

D. Hepatitis A&B

10. How many basic steps are involved in sewage water treatment?

A. 3

B. 4

C. **5**

D. 6

11. Solid form of petroleum is known as:

A. **Asphalt**

B. Crude Oil

C. Naphta Petrol

D. Fuel Oil

12. Process in which metal ions are reduced to free metals is called:

A. Roasting

B. Smelting

C. **Bessemerization**

D. Concentration

MCQs	1	2	3	4	5	6	7	8	9	10	11	12
Key	A	A	C	A	C	A	D	B	A	C	A	C

Time: 2 Hours 40 Minutes   **Marks:** 32

1. Attempt any **EIGHT** of the following short questions. Each question carries 4 marks.

i.   Define K_C? What is the importance of K_C?

Definition: (1 Mark)

K_C is known as equilibrium constant, general definition of equilibrium constant can be stated as,

The equilibrium constant K_C is the ratio of mathematical product of the concentration of substances formed (products) at equilibrium to the mathematical product of the concentrations of reacting substances (reactants).

Importance of K_C: (3 Marks)

The Value of K_C helps us to predict.

1. Direction of Reaction
2. The Extent of a chemical reaction.
3. The Effect of External conditions on the position of Equilibrium

ii.   Define Bronsted-Lowry concept of acid and bases. Give example.

Definition: (2 Marks)

A Bronsted-Lowry acid is a substance (molecule or ion) that is a proton (H^+) donor, where as a Bronsted Lowry base is a Substance (molecule or Ion) that is a proton (H+) acceptor.

Example: (2 Marks)

Consider the following reaction

$$HCl_{(aq)} + NH_{3(aq)} \rightleftharpoons NH_{4(aq)}^+ + Cl_{(aq)}^-$$ (1 Mark)
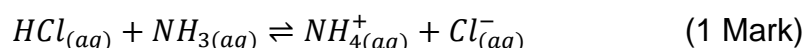
In this reaction, HCl donates a proton and act as an acid, while ammonia NH_3 accepts a proton to form ammonium ion NH_4^+ and serves as a base. (1 Mark)

iii. Differentiate between Ali-cyclic and Aromatic Organic compounds.

Ali-Cyclic Organic Compound:	Aromatic Organic Compound:
These are organic compounds which are in close chain structure forming a ring.	The cyclic organic compounds having alternate single and double bond in its structure.
They do not have delocalized pi-electron clouds.	They are composed of delocalized pi-electron clouds.

(1 Mark for each difference)

iv.   Write at least four characteristics of Organic compounds.

Characteristics of Organic Compound:

Some of the important characteristics are given below:

1. **Composition:**

    Organic compound mainly composed of carbon and hydrogen atoms.

2. Electrical Conductivity:

They are poor conductor of electricity due to presence of non-polar covalent bond.

3. Low Melting and Boiling Points:

They have generally low melting and boiling points because these compounds are held together by weak intermolecular forces.
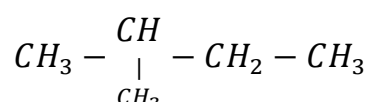
4. Covalent Nature:

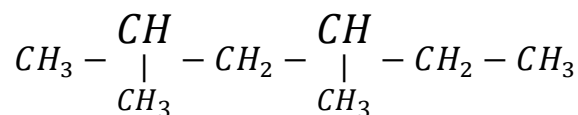Organic compounds are covalently bonded compounds.

(01 Marks for each Characteristic)

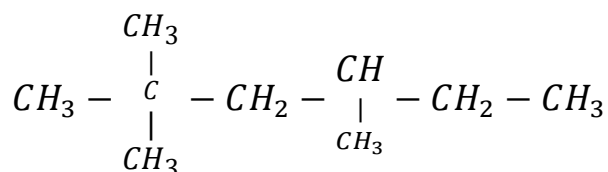**v. Draw structural formula of following Organic compounds.**
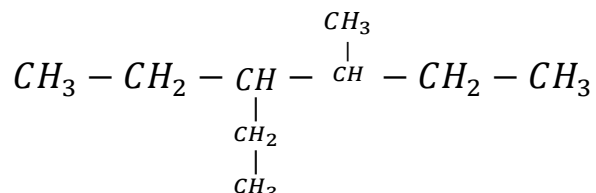
a. 2- Methyl Butane

$$CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3$$

b. 2,4 - Dimethyl Hexane

$$CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3$$

c. 2, 2, 4-tri methyl Hexane

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3$$

d. 3-ethyl 4-methyl Hexane

$$CH_3 - CH_2 - \underset{\underset{CH_2}{\underset{|}{|}}}{CH} - \overset{\overset{CH_3}{|}}{CH} - CH_2 - CH_3$$
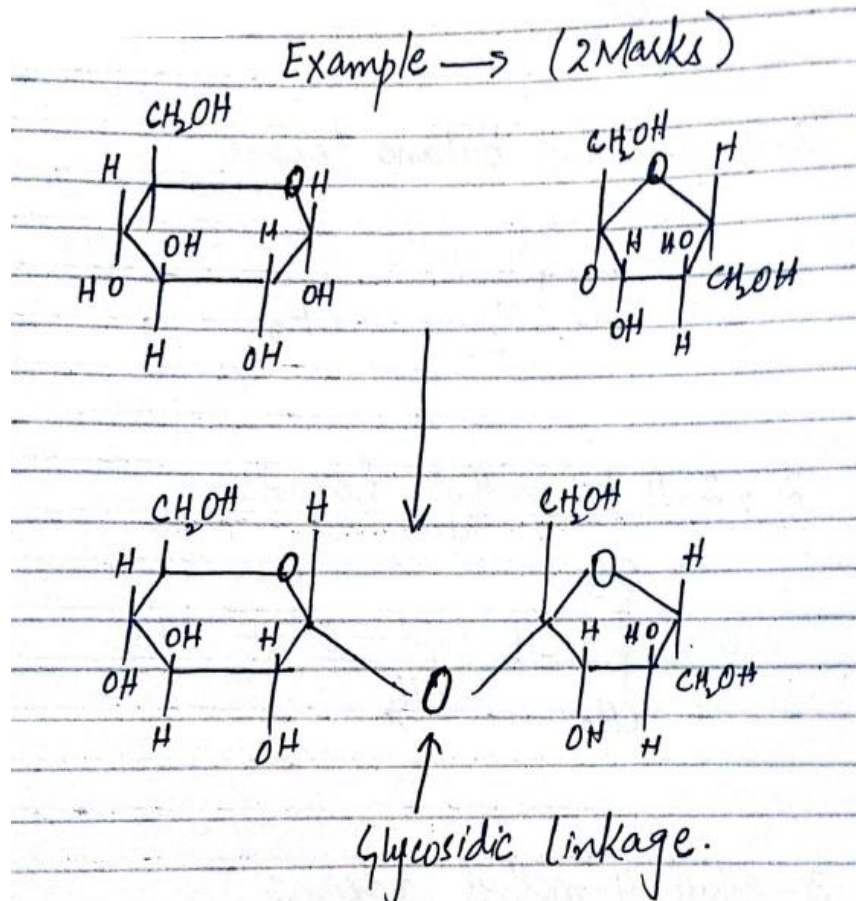$$\underset{CH_3}{}$$

(01 Mark for each Structure)

vi. Define Glycosidic Linkage? Support your answer with example.

Glycosidic Linkage: (1 Mark)

A glycosidic linkage is the link between the rings in an oligo saccharide or polysaccharide.

Example → (2 Marks)

Glycosidic linkage.

vii. How many vitamins are included in Vitamin-B complex? List three deficiencies related to Vitamin-B?

Vitamin-B (Complex) included complex of eight vitamins, which are B_1, B_2, B_3, B_4, B_5, B_6, Biotin, Folic acid and B_{12}. (01 Mark)

 Deficiency Symptoms: (03 Mark)

1. Skin Diseases
2. Tongue/ Lips Inflammation,
3. Anaemia

   (Other related deficiencies also considered)

viii. Write any four causes of Ozone layer depletion?

Causes of Ozone Layer Depletion: (04 Marks)

1. Ozone layer depletion due to (NO_X)
2. Ozone layer depletion due to Atomic (nascent) Oxygen
3. Ozone layer depletion due to oxides of Sulphur
4. Emission of Chlorofluorocarbons (CFCs)

ix. Define Hydrogen Bonding in water with the help of structure? (02 Marks)

The bonding formed between oxygen atom of one water molecule and hydrogen atom of another water molecule is known as hydrogen bonding.
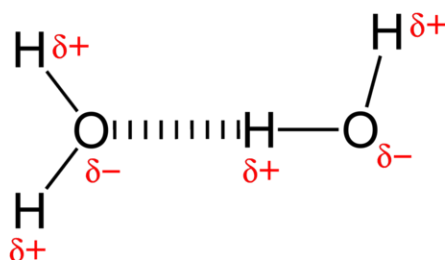
x. **Write two main differences between synthetic and organic fertilizers.**

Synthetic Fertilizers	Organic Fertilizers
1. Synthetic fertilizers are produced from petroleum or natural gas.	1. Most Organic Fertilizers are derived from animals and plants like manure, bone, blood, meat etc.
2. They are leach from the soil with watering.	2. They are naturally decomposed by soil microbes.

(01 Mark for each difference)

xi. **What are raw materials used for the manufacture of sodium carbonate?**

Raw material needed for the manufacture of sodium carbonate are:
1. Sodium Chloride ($NaCl$)
2. Lime Stone ($CaCO_3$)
3. Ammonia (NH_3)
4. Water (H_2O)

(01 Mark for each)

SECTION-C

Marks: 21

NOTE: Attempt any **THREE** of the following questions. Each question carries 7 marks.

2. i. What are the main conditions for attaining equilibrium in chemical reaction?   (4)

Main Conditions for Equilibrium:

As long as conditions are kept constant, the reaction will remain in equilibrium state.

Conditions are following:

a. Concentration of reactant and Product

b. Temperature of system

c. Pressure of system

d. Volume of system

e. Catalyst, if used in system remains unchanged.

(1 mark for each)

ii. Write any three ways in which Organic compounds can be represented?   3

Organic compound can be represented by:

1. Molecular Formula:

The formula which represents the actual number of atoms in one molecule of organic compound. Organic compound is called molecular formula.   (1 Mark)

e. g. Molecular formula of propane is C_3H_8,

which shows propanes consists of three carbon and eight hydrogen atoms.

2. Condensed formula:

The formula where the groups of atoms are shown in order as they appear in structural formula with no bonds and dashes.   (1 Mark)

Example: Hexane has six carbon atoms and fourteen hydrogen atoms with molecular formula C_6H_{14}.

3. Dot and Cross formula: (1 Mark)

A structural formula in which electrons are shown as dots and crosses between various atoms in one molecule of a compound are called dot and cross formula.
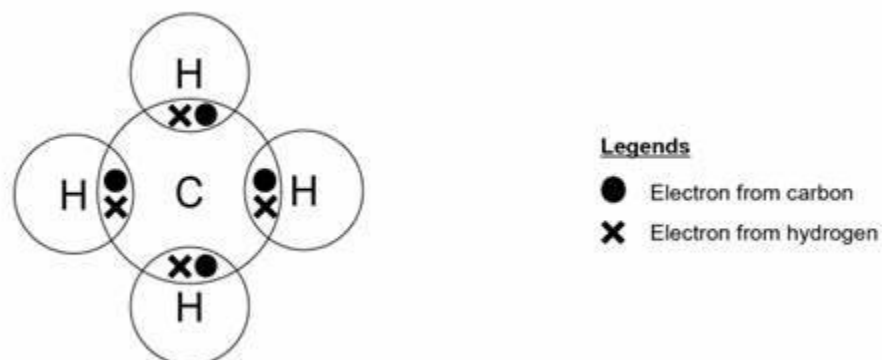
Dot Cross Formula of Methane

3. i. Calculate pH and pOH of 0.01 molar HCl? (03 Marks)

Solution:

$$HCl \rightarrow H^+ + Cl^-$$
$$0.01M \quad 0.01M$$

Hydrogen Ion concentration $= [H]^+ = 0.01$

$$= \frac{1}{100}$$

$$= [10^{-2}] \qquad \text{(1 Mark)}$$

$pH = -\log[H]^+$

Putting the values,

$pH = -\log[10^{-2}]$

$pH = -(-2)\log 10 \qquad\qquad \because \log 10 = 1$

$pH = 2 \qquad\qquad$ (1 Mark)

As we know that

$pH + pOH = 14$
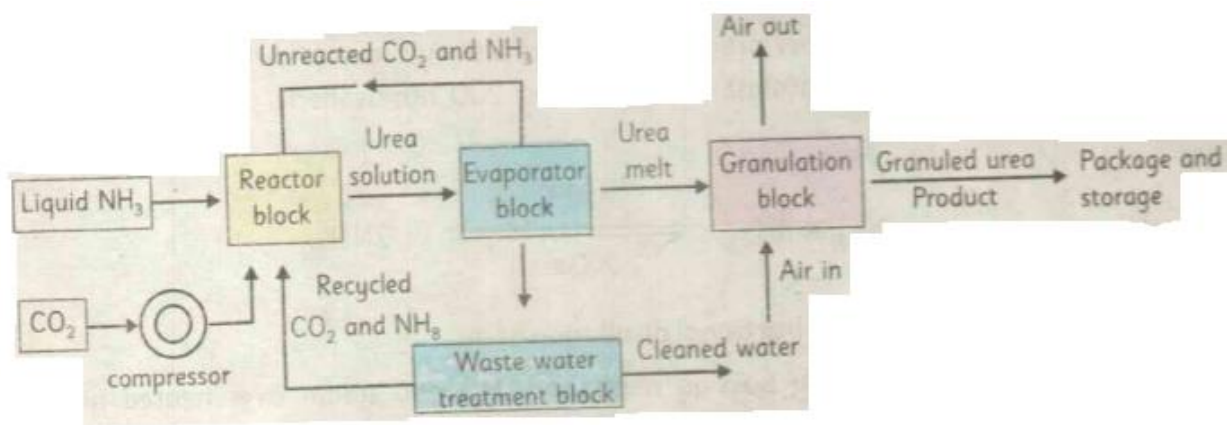
To calculate pOH above equation can be rearranged as

$pOH = 14 - pH$

$pOH = 14 - 2 = 12$

$\quad pOH = 12 \qquad\qquad$ (1 Mark)

ii. Draw flow sheet diagram of urea? (04 Marks)

Flow sheet Diagram of Urea:

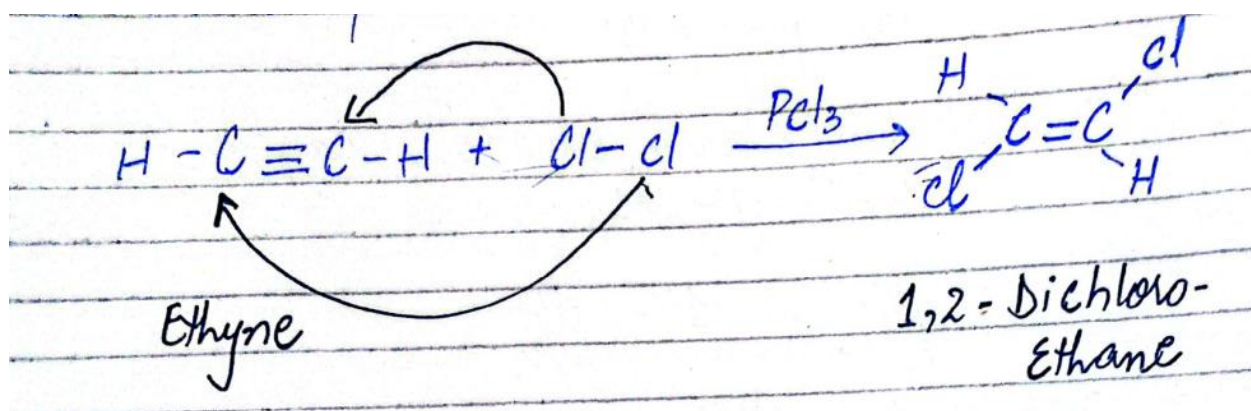**4. i. Write steps involved in hydrogenation of alkynes?** **(04 Marks)**

Halogenation:

Step I: **(02 Marks)**

In the first step, a halogen, chlorine molecule is added to the triple bond.

The triple bond is converted into double bond and forms 1,2-dichloroethene.

$$H-C\equiv C-H + Cl-Cl \xrightarrow{PCl_3} \begin{array}{c} H \\ Cl \end{array} C=C \begin{array}{c} Cl \\ H \end{array}$$
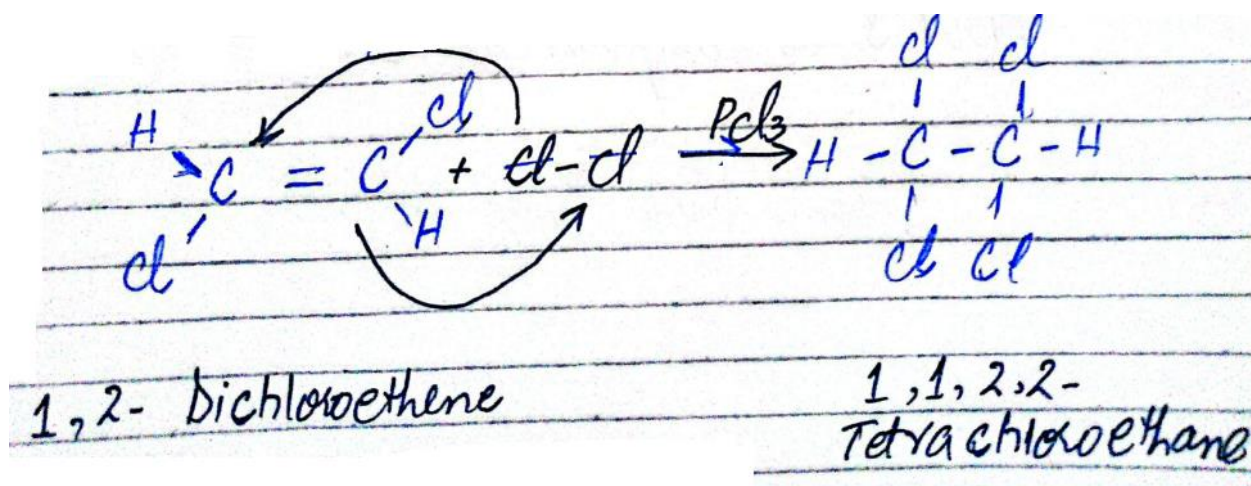
Ethyne   1,2-Dichloro-Ethane

Step II: (02 Mark)

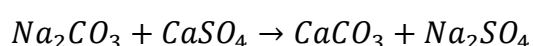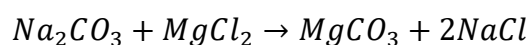In the second step, another chlorine molecule is added to the double bond.

The double bond is converted into single bond and forms 1,1,2,2-tetra chloroethane.

$$\begin{array}{c} H \\ Cl \end{array} C=C \begin{array}{c} Cl \\ H \end{array} + Cl-Cl \xrightarrow{PCl_3} H-\overset{Cl}{\underset{Cl}{C}}-\overset{Cl}{\underset{Cl}{C}}-H$$

1,2- Dichloroethene   1,1,2,2-Tetrachloroethane

ii. How permanent hardness is removed by using washing soda? Mention any three important reactions? **3**

**Removal of Temporary Hardness by using Washing Soda:** (03 Marks)

$$Na_2CO_3 + CaCl_2 \rightarrow CaCO_3 + 2NaCl$$
$$Na_2CO_3 + MgCl_2 \rightarrow MgCO_3 + 2NaCl$$
$$Na_2CO_3 + CaSO_4 \rightarrow CaCO_3 + Na_2SO_4$$
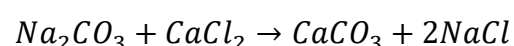
5. **i. Define peptide linkage? Support your answer with example.** **4**

Peptide Linkage: (02 Mark)

The linkage which joins carboxyl carbon of one amino acid with an amino group of another amino acid, forming a sequence $CONH_3$ is called **peptide linkage**. The resultant molecule is called **dipeptide**.
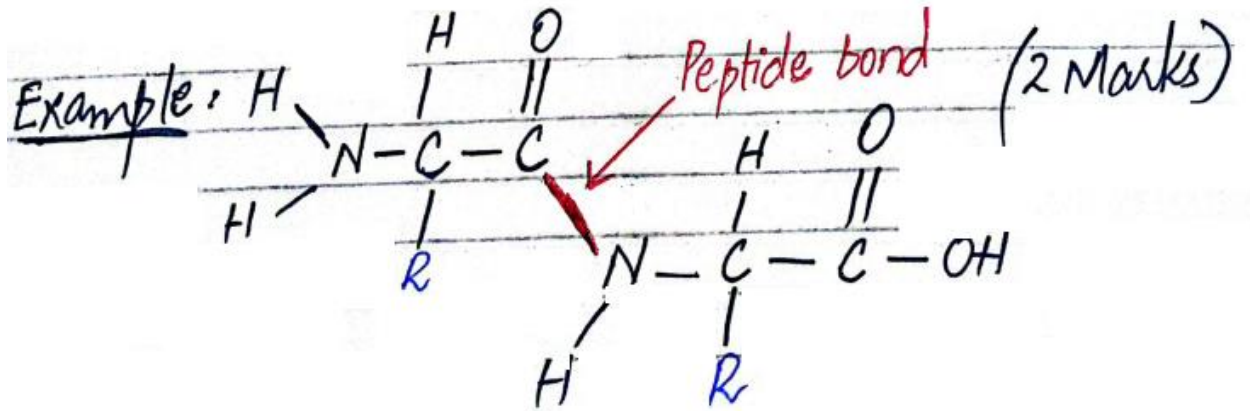
ii. Write three anthropogenic sources of air pollution. **3**

   Anthropogenic Sources of Air Pollution:

a. **Particulates**:

   Including combustion of fuels wood burning construction etc.

b. **Volatile Organic Compounds**:

   Including methane gas and automobile exhausts.

c. **Chlorofluorocarbon**:

   It is released to the atmosphere by the use of aerosols containing sprays and leakages from refrigerators and air conditioners.