

- Note:**
- (i) All questions are compulsory.
 - (ii) Use of calculator is not allowed.
 - (iii) The numbers to the right of the questions indicate full marks.
 - (iv) In case of MCQs Q.1. (A) only the first attempt will be evaluated and will be given credit.
 - (v) For every MCQ, the correct alternative a, b, c, or d with sub-question number is to be written as an answer.
For e.g. i. a, ii. b, iii. c.
 - (vi) Scientifically correct, labelled diagrams should be drawn wherever necessary.

Q.1. (A) Choose the correct alternative. [5]

- i. According to Mendeleev's periodic law, properties of elements are periodic function of their _____.
 - a. atomic numbers
 - b. atomic masses
 - c. densities
 - d. boiling points
- ii. The vapour content in the air is measured using a physical quantity called _____.
 - a. absolute humidity
 - b. relative humidity
 - c. dew point
 - d. humidity
- iii. For the normal human eye, the near point is at _____ cm.
 - a. 10
 - b. 20
 - c. 25
 - d. 30
- iv. The astronomical object closest to us in our galaxy is _____.
 - a. Mars
 - b. Venus
 - c. Jupiter
 - d. Moon
- v. In the Wilfley table method, the particles of gangue are separated by _____ separation method.
 - a. magnetic
 - b. froth floatation
 - c. hydraulic
 - d. gravitational

(B) Answer the following. [5]

i. **Find the odd one out.**

Voltmeter, Ammeter, Thermometer, Galvanometer

ii. **Find the correlation and write in one sentence.**

Alkene : $C = C$:: Alkyne : _____

iii. **State true or false.**

The frequency of AC is 50 Hz.

iv. **Make pairs.**

Column A	Column B
1. The wavelength of red light	a. 600 nm
	b. 700 nm
	c. 500 nm

v. Name the first artificial satellite sent by Russia in space.

Q.2. (A) Give scientific reasons. (Any two) [4]

i. The weight of an object changes from place to place though its mass is constant.

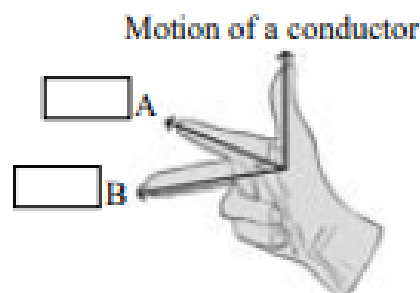
ii. Stars twinkle but we do not see the twinkling of planets.

iii. Elements belonging to the same group have the same valency.

(B) Answer the following. (Any three) [6]

i. How much heat energy is necessary to raise the temperature of 5 kg of water from 20°C to 100°C ?

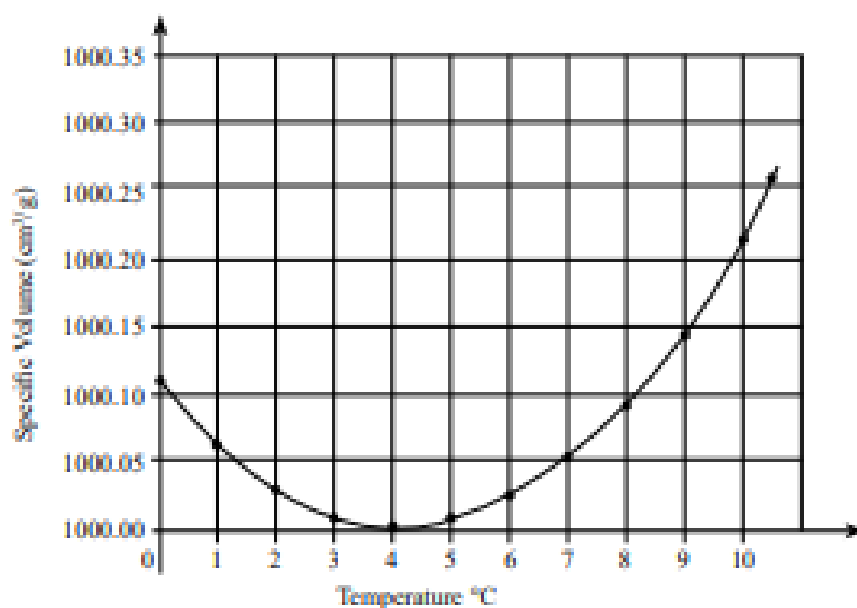
ii. Observe the given figure of Fleming's Right Hand Rule and write the labels of A and B correctly.



iii. **Observe the given graph and answer the following questions.**

a. Name the process represented in the figure.

b. At what temperature does this process take place?



iv. Complete the given chemical reaction.

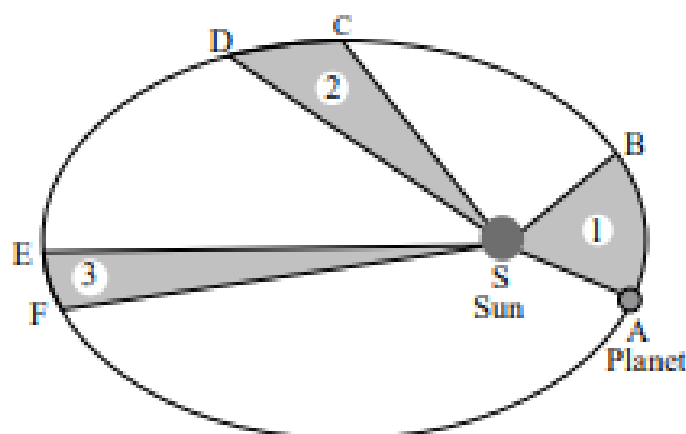


Name the type of reaction.

v. Write a short note on alloying.

Q.3. Answer the following questions. (Any five) [15]

- i. An element has its electronic configuration as 2, 8, 2. Now, answer the following questions.
 - a. What is the atomic number of this element?
 - b. What is the group of this element?
 - c. To which period does this element belong?
- ii. Observe the given figure showing the orbit of a planet moving around the Sun and write the three laws related to it.



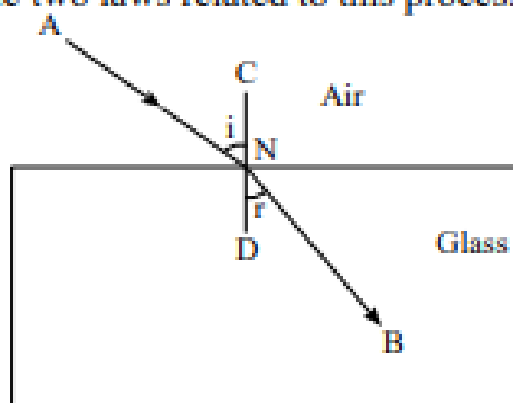
iii. **Read the given passage and answer the following questions.**

The home electrical connection consists of 'live', 'neutral' and 'earth' wires. The 'live' and the 'neutral' wires have potential difference of 220 V. The 'earth' is connected to the ground. Due to a fault in equipment, or if the plastic coating on the 'live' and the 'neutral' wires gives away, the two wires come in contact with each other and a large current flows through it producing heat. If any inflammable material (such as wood, cloth, plastic, etc.) exists around that place, then it can catch fire. Therefore, a fuse wire is used as a precautionary measure.

- Name the two wires having potential difference of 220 V.
- What is short circuit?
- Write the function of a fuse.

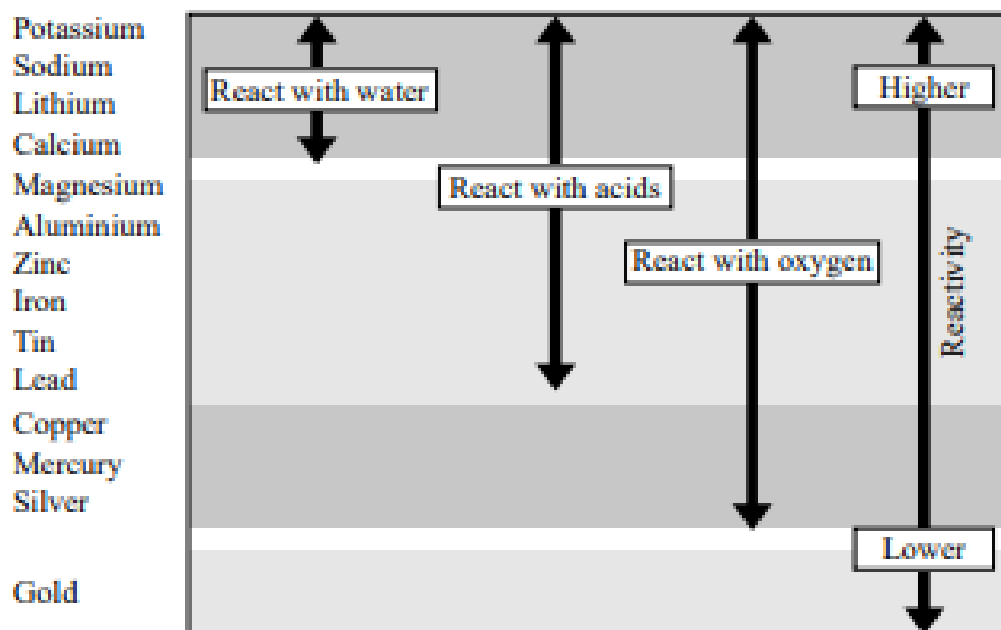
iv. **Observe the given figure and answer the following questions.**

- Name the process represented in the figure.
- State the two laws related to this process.



- What is an artificial satellite? Name any two types of artificial satellites and state their functions.**
- Answer the following questions.**
 - Define hydrocarbons.
 - Name the types of hydrocarbons.
 - Name two carbon compounds used in day-to-day life.

vii. Observe the given figure of reactivity series of metals and answer the following questions.



Reactivity series of metals

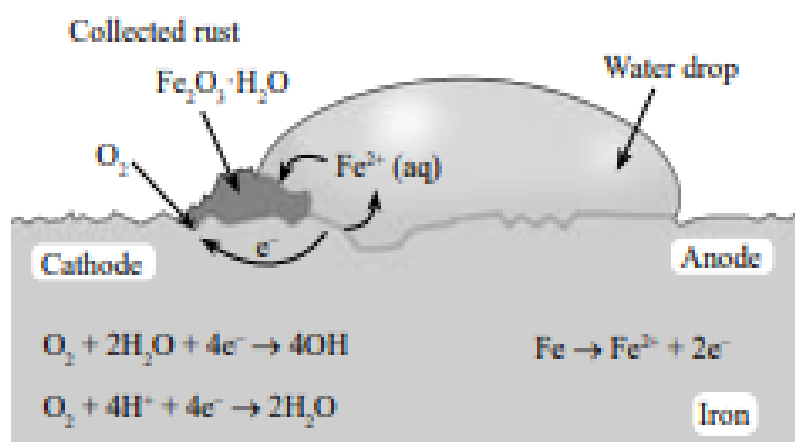
- Name two metals which react with water.
- Name two moderately reactive metals.
- Name the most highly reactive metal and the least reactive metal.

viii. Complete the following table.

Straight chain of carbon compounds	Structural formula	Molecular formula	Name
C	$ \begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{H} \\ \\ \text{H} \end{array} $	CH ₄	Methane
C – C			Ethane
C – C – C		C ₃ H ₈	
C – C – C – C	$ \begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H} - \text{C} & - \text{C} - & \text{C} - & \text{C} - \text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $		

Q.4. Answer any one of the following. [5]

- i. Draw a scientifically correct labelled diagram of a human eye and answer the questions based on it.
- Name the type of lens in the human eye.
 - Name the screen at which the maximum amount of incident light is refracted.
 - State the nature of the image formed of the object on the screen inside the eye.
- ii. Observe the following picture and answer the questions.
- What is rust?
 - Write the chemical formula of rust.
 - Write the reaction of oxidation of iron at anode.
 - Write the reaction of oxidation of iron at cathode.
 - What is corrosion?



★★★

Q.1. (A) Choose the correct alternative. [5]

- i. According to Mendeleev's periodic law, properties of elements are periodic function of their _____.
- | | |
|-------------------|-------------------|
| a. atomic numbers | b. atomic masses |
| c. densities | d. boiling points |

Ans. b.

ii. The vapour content in the air is measured using a physical quantity called _____.

- a. absolute humidity
- b. relative humidity
- c. dew point
- d. humidity

Ans. a.

iii. For the normal human eye, the near point is at _____ cm.

- a. 10
- b. 20
- c. 25
- d. 30

Ans. c.

iv. The astronomical object closest to us in our galaxy is _____.

- a. Mars
- b. Venus
- c. Jupiter
- d. Moon

Ans. d.

v. In the Wilfley table method, the particles of gangue are separated by _____ separation method.

- a. magnetic
- b. froth floatation
- c. hydraulic
- d. gravitational

Ans. d.

(B) Answer the following. [5]

i. Find the odd one out.

Voltmeter, Ammeter, Thermometer, Galvanometer

Ans. Thermometer

Thermometer doesn't work on the principle of magnetic effect of the electric current, whereas all the others work on the principle of magnetic effect of the electric current.

ii. Find the correlation and write in one sentence.

Alkene : $C = C$: : Alkyne : _____

Ans. $C = C$. Alkenes contain carbon - carbon double bond; whereas alkynes contain carbon - carbon triple bond.

iii. State true or false.

The frequency of AC is 50 Hz.

Ans. True. The frequency of AC supply in India is 50 Hz.

iv. **Make pairs.**

Ans.

Column A	Column B
1. The wavelength of red light	b. 700 nm

v. **Name the first artificial satellite sent by Russia in space.**

Ans. Sputnik

Q.2. (A) Give scientific reasons. (Any two) [4]

i. **The weight of an object changes from place to place though its mass is constant.**

Ans.

- (a) The weight of an object is the force with which Earth (or any other planet/Moon) attracts the object by its gravity. It is given by the formula, $W = F = mg$.
- (b) Thus, the weight depends on mass (m) and acceleration due to gravity (g) of Earth.
- (c) Mass of an object is the amount of matter contained in the object, so it is same everywhere.
- (d) Acceleration due to gravity is given by the formula, $g = \frac{GM}{r^2}$, where r is the radius, G is the gravitational constant, and M is the mass of the planet. So, it depends on the mass and the radius of the planet.
- (e) Therefore, as acceleration due to gravity (g) is not the same everywhere, the weight of an object changes from place to place, though its mass is constant.

ii. **Stars twinkle but we do not see the twinkling of planets.**

Ans.

- (a) Stars are self-luminous. They appear to be point sources as they are at a large distance from us.
- (b) So, the light coming from stars undergoes refraction many number of times due to the changes in refractive index caused by the changes in atmospheric conditions like, density of the air, and temperature.
- (c) Because of this, the position and brightness of the star changing continuously and the star appears to be twinkling.

- (d) But planets are much closer to us as compared to stars. Therefore, they do not appear as point sources, but as a collection of a large number of point sources of light.
- (e) Because of changes in atmospheric refractive index, the position as well as the brightness of individual point sources change, but the average position and the total average brightness remain unchanged. Therefore, planets do not twinkle.

iii. Elements belonging to the same group have the same valency.

Ans.

- (a) Valency is the number of electrons given, taken, or shared by an atom.
- (b) All the elements in the same group have the same number of electrons in the outermost shell.
- (c) Thus, all elements in a particular group give, take or share the same number of electrons.
- (d) Hence, elements in the same group show the same valency.
- (e) Example – In group 1, i.e. alkali metals, the number of valence electron is 1. In group 17, i.e. halogens, the number of valence electrons is 7.

(B) Answer the following. (Any three) [6]

- i. How much heat energy is necessary to raise the temperature of 5 kg of water from 20 °C to 100 °C?**

Solution:

Given: Mass of water (m) = 5 kg = 5,000 g

Change in temperature (ΔT) = 100 – 20 = 80 °C

Specific heat of water (c) = 1 cal/g °C

To find: Heat energy (Q) = ?

Working: Energy absorbed by water = $m \times c \times \Delta T$

$$= 5000 \times 1 \times 80$$

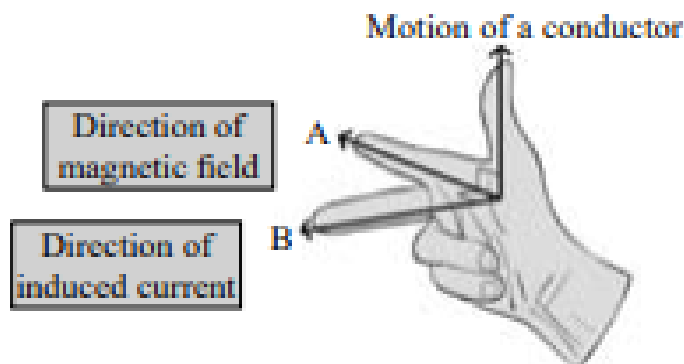
$$= 4,00,000 \text{ cal} = 400 \text{ kcal}$$

Ans. The heat energy needed to raise the temperature of water is **400 kcal**.

- ii. **Observe the given figure of Fleming's Right Hand Rule and write the labels of A and B correctly.**

(Note: Refer to Activity Sheet - March 2020 for figure.)

Ans.



- iii. **Observe the given graph and answer the following questions.**

(Note: Refer to Activity Sheet - March 2020 for graph.)

- a. **Name the process represented in the figure.**

Ans. The process represented in the figure is the anomalous behaviour of water which is studied using Hope's apparatus.

- b. **At what temperature does this process take place?**

Ans. The anomalous behaviour of water takes place when its temperature is between 0 °C and 4 °C.

- iv. **Complete the given chemical reaction.**



Name the type of reaction.

Ans. $\text{CuSO}_4 (\text{aq}) + \text{Fe} (\text{s}) \rightarrow \underline{\text{FeSO}_4} + \underline{\text{Cu}}$

This is a displacement reaction.

- v. **Write a short note on alloying.**

Ans.

- (a) The homogenous mixture formed by mixing a metal with other metals or non-metals in certain proportion is called an alloy.
- (b) Alloying of metals helps to decrease the intensity of corrosion of metals.

- (c) As a result, the metals do not get affected by Sun, rain and air and they doesn't rust also.
- (d) Examples: Bronze is an alloy of 90% copper and 10% tin. Stainless steel is an alloy of 74% iron, 18% chromium and 8% carbon.

Q.3. Answer the following questions. (Any five) [15]

i. An element has its electronic configuration as 2, 8, 2. Now answer the following question.

a. What is the atomic number of this element?

Ans. The atomic number of this element is 12. This element is magnesium (Mg).

b. What is the group of this element?

Ans. The group of this element is 2.

c. To which period does this element belong?

Ans. This element belongs to third period.

ii. Observe the given figure showing the orbit of a planet moving around the Sun and write the three laws related to it.

(Note: Refer to Activity Sheet - March 2020 for figure.)

Ans. The laws depicted in the figure are Kepler's laws of planetary motion.

The three Kepler's laws of planetary motion are as follows:

- (a) Kepler's first law: The orbit of a planet is an ellipse with the Sun at one of the foci.
- (b) Kepler's second law: The line joining the planet and the Sun sweeps equal areas in equal intervals of time.
- (c) Kepler's third law: The square of period of revolution of a planet around the Sun is directly proportional to the cube of the mean distance of the planet from the Sun.

iii. Read the given passage and answer the following questions.

The home electrical connection consists of 'live', 'neutral' and 'earth' wires. The 'live' and the 'neutral' wires have potential difference of 220 V. The 'earth' is connected to the ground. Due to a fault in equipment, or if the plastic coating on the 'live' and the 'neutral' wires gives away, the two wires come in contact with each other and a large current flows through it producing heat. If any inflammable material (such as wood, cloth, plastic, etc.) exists around that place, then it can catch fire. Therefore, a fuse wire is used as a precautionary measure.

a. Name the two wires having potential difference of 220 V.

Ans. The live and the neutral wires have potential difference of 220 V.

b. What is short circuit?

Ans.

1. The domestic electrical connection consists of 'live', 'neutral', and 'earth' wires.
2. Sometimes, due to a fault in the equipment, or if the plastic coating on the 'live' and the 'neutral' wires gives away, the 'live' and 'neutral' wires come in contact with each other.
3. As a result, a large current flows through the circuit, producing heat. This is called short circuit.

c. Write the function of a fuse.

Ans. A fuse is an electrical safety device which provides protection from short circuit and overloading. It consists of a thin metal wire enclosed in a noncombustible material, such as glass. When excess current flows through the circuit, the metal wire melts, so that the power supply is disconnected. Thus it protects the electrical circuit.

iv. Observe the given figure and answer the following questions.

a. Name the process represented in the figure.

Ans. The process represented in the above figure is the refraction of light ray when light enters glass from air.

b. State the two laws related to this process.

Ans. Two laws of refraction are as follows:

1. At the point of incidence (N), the incident ray and the refracted ray are on the opposite sides of the normal to the surface of separation of the two media. And the incident ray, the refracted ray, and the normal lie in the same plane.
2. For a given pair of media, the ratio of $\sin i$ to $\sin r$ is a constant. This constant is called the refractive index of the second medium with respect to the first medium. This law is also called Snell's law. This can be written as $\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = {}_2n_1$, where i is the angle of incidence, r is the angle of refraction, and ${}_2n_1$ is the refractive index of the second medium with respect to the first medium.

v. What is an artificial satellite? Name any two types of artificial satellites and state their functions.

Ans. A manmade object revolving around Earth or any other planet in a fixed orbit is called an artificial satellite.

Satellites are classified into different categories depending on their functions. Weather satellites and communication satellites are two examples.

1. **Weather satellite:** It is used to study and predict the weather. For example, INSAT and GSAT.
2. **Communication satellite:** It establishes communication between different locations in the world by specific waves. For example, INSAT and GSAT.

vi. Answer the following questions.

a. Define hydrocarbons.

Ans. The compounds which contain carbon and hydrogen as the only two elements are called hydrocarbons.

b. Name the types of hydrocarbons.

Ans. Hydrocarbons are of two types - saturated hydrocarbons and unsaturated hydrocarbons. Hydrocarbons in which valencies of all the atoms are satisfied by single bonds are called saturated hydrocarbons or alkanes. Hydrocarbons having a double bond or a triple bond between two carbon atoms are called unsaturated hydrocarbons.

c. Name two carbon compounds used in day-to-day life.

Ans. Methane (CH_4) is used as a fuel. Ethylene (C_2H_4) is used to make carry bags and sportswear.

vii. Observe the given figure of reactivity series of metals and answer the following questions.

(Note: Refer to Activity Sheet - March 2020 for figure.)

a. Name two metals which react with water.

Ans. Two metals which react with water are sodium and potassium.

b. Name two moderately reactive metals.

Ans. Two moderately reactive metals are magnesium and zinc.

c. Name the most highly reactive metal and the least reactive metal.

Ans. Potassium is the highly reactive metal, and gold is the least reactive metal.

viii. Complete the following table.

(Note: Refer to Activity Sheet - March 2020 for table.)

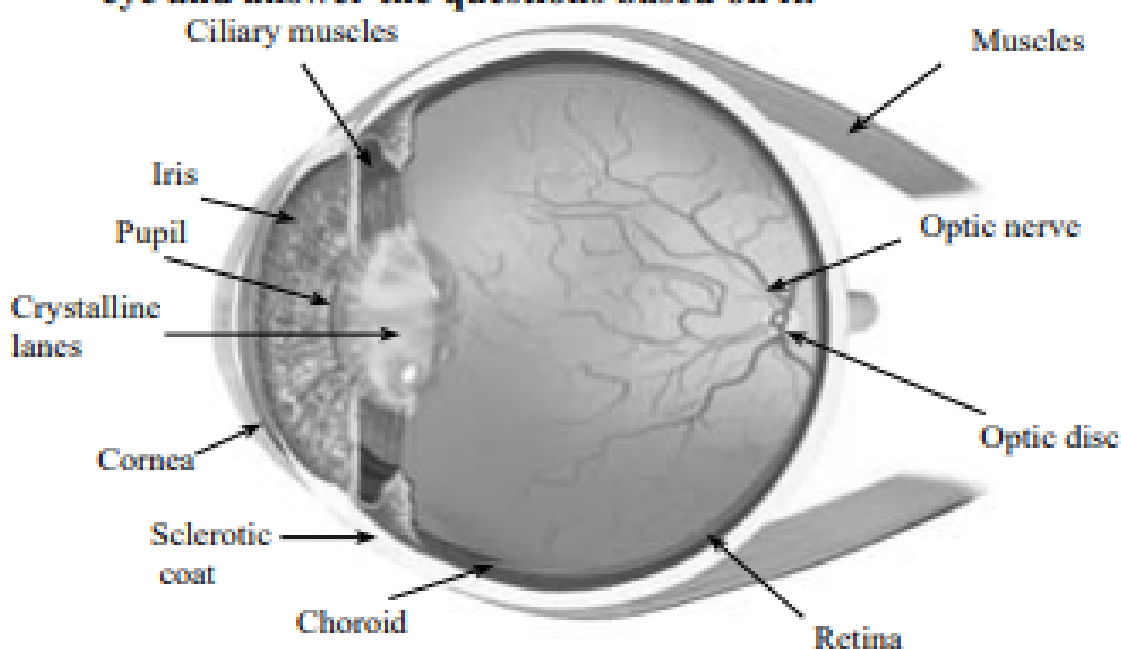
Ans.

Straight chain of carbon compounds	Structural formula	Molecular formula	Name
C	$\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{H} \\ \\ \text{H} \end{array}$	CH_4	Methane
C - C	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	C_2H_6	Ethane

Straight chain of carbon compounds	Structural formula	Molecular formula	Name
$C - C - C$	<pre> H H H H - C - C - C - H H H H </pre>	C_3H_8	Propane
$C - C - C - C$	<pre> H H H H H - C - C - C - C - H H H H H </pre>	C_4H_{10}	Butane

Q.4. Answer any one of the following. [5]

- i. Draw a scientifically correct labelled diagram of a human eye and answer the questions based on it.**



- a. Name the type of lens in the human eye.**

Ans. The lens in the human eye is a double convex transparent crystalline lens.

- b. Name the screen at which the maximum amount of incident light is refracted.**

Ans. Maximum amount of incident light is refracted inside the eye at the outer surface of the cornea.

- c. **State the nature of the image formed of the object on the screen inside the eye.**

Ans. The nature of the image formed of the object on the screen inside the eye is real and inverted.

- ii. **Observe the following picture and answer the questions.**

(Note: Refer to Activity Sheet - March 2020 for figure.)

- a. **What is rust?**

Ans. When iron is exposed to air and moisture, a reddish coloured solid layer of hydrated ferric oxide is formed on its surface. This is called rust.

- b. **Write the chemical formula of rust.**

Ans. The chemical formula of rust is $\text{Fe}_2\text{O}_3 \cdot \text{XH}_2\text{O}$.

- c. **Write the reaction of oxidation of iron at anode.**

Ans. At anode, Fe is oxidized to Fe^{2+} .

Reaction at the anode: $\text{Fe(s)} \rightarrow \text{Fe}^{2+}(\text{aq}) + 2\text{e}^-$

- d. **Write the reaction of oxidation of iron at cathode.**

Ans. At cathode, O_2 is reduced to form water.

Reaction at the cathode:



- e. **What is corrosion?**

Ans. Due to various components of atmosphere, oxidation of metals takes place, resulting in their damage. This is called corrosion.