



समग्र शिक्षा  
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**100**  
**Days**

**Action Plan**  
**SSC - 2026**

*Shining Stars*  
*(A, B Grade Students)*

**SSC**

*Special Edition*

# **Physical Science**

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## Chapter – 1: Chemical Reactions and Equations

### 8 Marks Questions

**1. What are the differences between displacement and double displacement reactions? Write equations for these reactions.**

**Ans:**

Displacement reaction	Double displacement reaction
The reaction in which an element has displaced or removed another element from the molecule is called displacement reaction.	The reaction in which there is an exchange of ions between the reactants are called double displacement reactions.
More active element displaces a less active element.	Two different atoms or ions are exchanged.
Generally reaction time is slow.	Generally reaction time is fast.
Ex: $\text{Mg (s)} + 2\text{HCl (aq)} \rightarrow \text{MgCl}_2 \text{ (aq)} + \text{H}_2 \text{ (g)}$	$\text{NaSO}_4 \text{ (aq)} + \text{BaCl (aq)} \rightarrow \text{BaSO}_4 \text{ (s)} + 2 \text{NaCl (aq)}$

**2. Explain the following terms with one example each.**

**i) Corrosion   ii) Rancidity   iii) Oxidation   iv) Reduction**

**Ans: i) Corrosion:** When a metal is attacked by substances around it such as moisture, acids etc. it is said to corrode and this process is called corrosion.

The black coating on silver and the green coating on copper are examples of corrosion.

**ii) Rancidity:** When fats/oils containing food materials for long time, they become rancid and their smell and taste change. This is called rancidity.

Keeping food in air tight containers helps to slow down oxidation. The chips manufactures usually flush bags of chips with gas such as nitrogen to prevent the chips from getting oxidized.

**iii) Oxidation:** A chemical reaction in which a substance gains oxygen is called oxidation.



**iv) Reduction:** A chemical reaction in which a substance loses oxygen is called reduction.



### 1 Mark Questions

**1. State the law of conservation of mass in a chemical reaction.**

**Ans:** Mass can neither be created nor destroyed in a chemical reaction.

**2. What is the common name for calcium oxide (CaO)?**

**Ans:** The common name for calcium oxide is quick lime.

**3. What type of reaction occurs in the digestion of food in our body?**

**Ans:** Decomposition reaction.

**4. What type of reaction occurs when an iron nail is placed in copper sulphate solution?**

**Ans:** A displacement reaction

**5. What is the general term for the process where a metal is attacked by moisture or acids?**

**Ans:** Corrosion.

**6. What is the main cause of damage to objects made of iron?**

**Ans:** Corrosion of iron, also known as rusting, is a serious problem causing damage.

**7. Name two effects of oxidation in daily life.**

**Ans:** (i) Corrosion (ii) Rancidity

**8. Name the gas that can be used for storage of fresh sample of chips for a long time.**

**Ans:** Nitrogen.

**9. What type of reaction takes place during respiration?**

**Ans:** Exothermic reaction

## Chapter – 9: Light – Reflection and Refraction

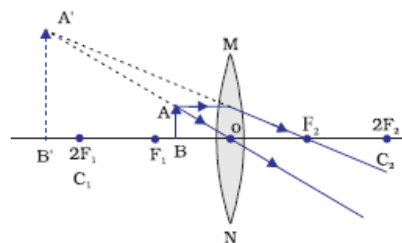
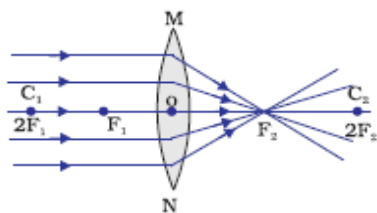
### 4 Marks Questions

1. Draw the ray diagrams of image formed when the object is placed in front of a bi-convex lens in the following positions.

(a) At

(b) Between F and Optical centre O

**Ans:**

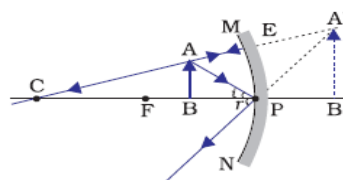
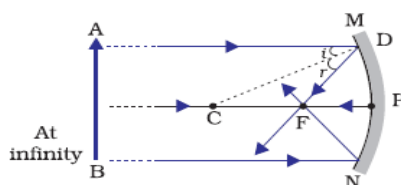


2. Draw the ray diagrams of image formed when the object is placed in front of a concave mirror in the following positions.

(a) At infinity

(b) Between P and F

**Ans:**



### 4 Marks Questions

1.

Material medium	Air	Water	Benzene	Diamond
Speed of light in the medium	$3 \times 10^8$	$\frac{9}{4} \times 10^8$	$2 \times 10^8$	$\frac{5}{4} \times 10^8$

Observe the table and answer the following questions.

- Which material medium light travels faster?
- Which material medium light travels lowest?
- In which material medium the refractive index is least?
- In which material medium the refractive index is greatest?
- Calculate the refractive index of Benzene? (Speed of light in vacuum is  $3 \times 10^8 \text{ ms}^{-1}$ )

**Ans:** i) Air

ii) Diamond

iii) Air

iv) Diamond

v) Refractive index of Benzene ( $n$ ) =  $C/V = 3 \times 10^8 / 2 \times 10^8 = 1.5$

2.

Material medium	Air	Ice	Water	Kerosene	Benzene	Rock salt	Diamond
Refractive Index	1.0003	1.31	1.31	1.44	1.50	1.54	2.42

Observe the table and answer the following questions.

- What happens to the speed of light when light is passing from Water to Rock salt?
- Whether the refracted ray bends towards normal or away from the normal when light ray travelled from Benzene to Air?
- The refractive index of Diamond is 2.42. What is the meaning of this statement?
- What is reason, refractive index of kerosene is more than the refractive index of water?

**Ans:** i) Decreases

- ii) Increases  
 iii) The ratio of speed of light in air to speed of light in diamond is 2.42  
 iv) Optical density of kerosene is more than the optical density of water.

3. If radius of curvature of the mirror is double times of the focal length, then complete the following table

f (in cm)	R (in cm)
12	
24	
	15
	20

Ans:

f (in cm)	R (in cm)
12	24
24	48
7.5	15
10	20

4. Fill the table following, which is related to convex lens.

Position of the Object	Position of the Image	Relative Size of the image	Nature of the image
Beyond $2F_1$			Inverted
	At $2F_2$	Same size	
Between $F_1$ and $2F_1$		Enlarged	
	Behind the lens		Erected

Ans:

Position of the Object	Position of the Image	Relative Size of the image	Nature of the image
Beyond $2F_1$	Between $F_2$ and $2F_2$	Diminished	Real and inverted
At $2F_1$	At $2F_2$	Same size	Real and inverted
Between $F_1$ and $2F_1$	Beyond $2F_2$	Enlarged	Real and inverted
Between $F_1$ and optical centre O	Same side of the lens	Enlarged	Erected

### 1 Mark Questions

1. Find the focal length of a convex mirror whose radius of curvature is 32 cm.

Ans: Focal length of a convex mirror ( $f$ ) =  $\frac{R}{2} = \frac{32}{2} = 16 \text{ cm}$

2. Find the power of a concave lens of focal length 2 m.

Ans: Focal length of a concave lens ( $f$ ) = - 2 m

Power of a concave lens ( $P$ ) =  $\frac{1}{f} = \frac{1}{-2} = -0.5 \text{ D}$

3. The refractive index of diamond is 2.42. What is the meaning of this statement?

Ans: The speed of light in diamond is lowest. The ratio of speed of light in air to diamond is 2.42

4. A lens has a power of +2.0 D. What type of lens is it?

Ans: Convex lens.

5. The power of a lens is - 4.0 D. What is the nature of the lens?

Ans: Diverging lens.

6. If the magnification of a lens is -1, what is the nature of the image?

Ans: The image is real, inverted, and of the same size as the object.

### 2 Marks Questions

1. A ray of light travelling in air enters obliquely into water. Predict and write whether that light ray bends towards the normal or away from the normal? Why?

Ans: It bends towards the normal. Because light ray travelling from an optically rarer medium into an optically denser medium.

**2. One-half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer (or)**

**What happens to the image formed by a convex lens if its lower part is blackened?**

**Ans:** Every part of a lens forms an image. When one-half of a convex lens is covered with a black paper, it still forms the complete image of the object as remaining part of lens. But intensity of the image is reduced.

**3. The magnification produced by plane mirror is +1. What does this mean?**

**Ans:** It means that the size of the image is equal to the size of the object. The positive sign indicates the image is virtual and erect.

**4. A ray passing through the centre of curvature of a concave mirror, after reflection, is reflected back along the same path. Why?**

**Ans:** The incident rays fall on the concave mirror along the normal to the reflecting surface.

**5. If A, B are optical medium of their refractive indices are nearly same, then light travel from A to B, What happens? (or) What happens to a ray of light when it travels from one medium to another medium having equal refractive indices?**

**Ans:** There is no refraction of light when it travels from one medium to another.

**6. If you want to see an enlarged image of your face, which type of mirror will you see? Where will you place your face?**

**Ans:** Concave mirror. The face should be placed between the pole and the focus of the mirror.

**7. What happens when a ray of light strikes the surface of separation between the two media at right angle?**

**Ans:** The ray of light passes undeviation from one medium to another. Because  $\angle I = \angle r = 0^\circ$

**9. What happens to a ray of light that passes through the principal focus of a concave mirror after reflection?**

**Ans:** It will emerge parallel to the principal axis after reflection.

**10. What happens to a light ray travels from denser medium to rarer medium?**

**Ans:** A light ray travelling obliquely from a denser medium to a rarer medium bends away from the normal.

## Chapter – 2: Acids, Bases and Salts

### 8 Marks Questions

**1. Describe an activity to show the water of crystallisation.**

**Aim:** To show the water of crystallisation.

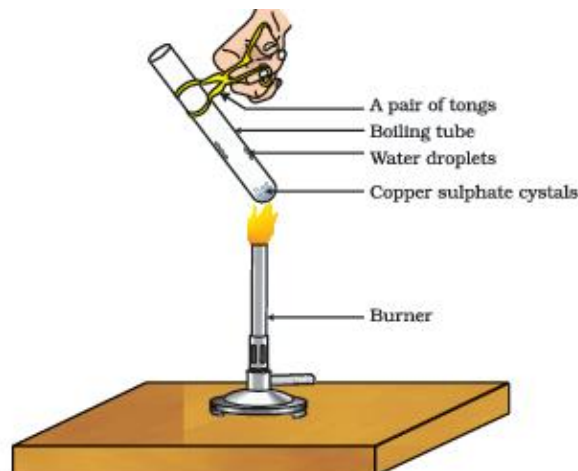
**Required Materials:** Copper sulphate crystals, Test tube, Burner, A pair of tongs, water.

**Procedure:**

- Take a few crystals of blue colour copper sulphate in a dry test tube and heat the test tube.
- We observed that blue colour salt turns white and water droplets on the walls of the test tube.
- Add 2-3 drops of water on the sample of copper sulphate obtained after heating.
- We observed that blue colour of salt is restored.

**Observation:**

We conclude that some water molecules are fixed in the blue coloured copper sulphate crystals.



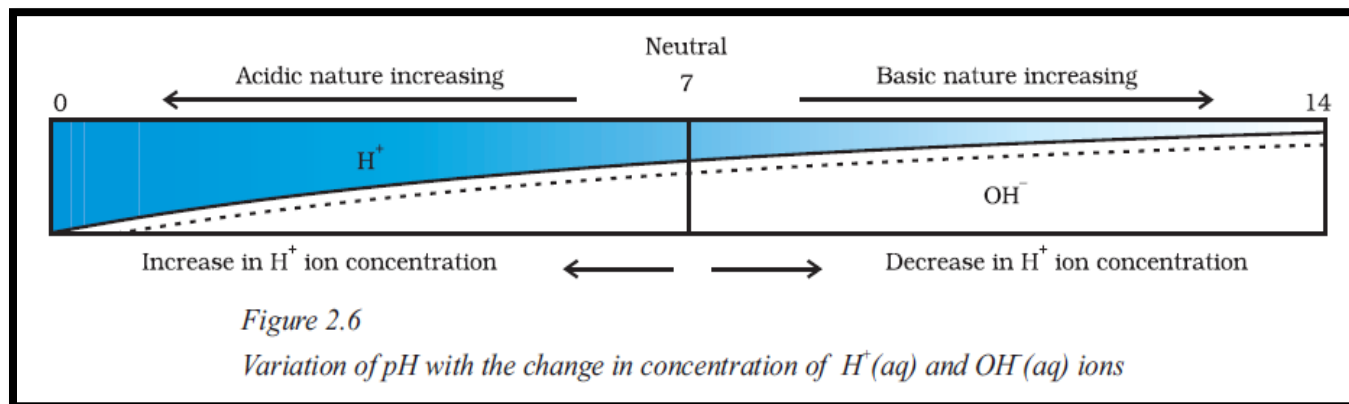
## 4 Marks Questions

1. Give important uses of Plaster of Paris (or) Write the uses of Plaster of Paris.

- Ans:** i) Doctors use as plaster of Paris for supporting fractured bones in the right position.  
 ii) Plaster of Paris is used for making toys.  
 iii) materials for decoration.  
 iv) for making surfaces smooth.

## 4 Marks Questions

1. Draw a diagram showing the variation of pH with the change in concentration of  $H^+$  and  $OH^-$



## 2 Mark Questions

1. Why is it recommended to add acid to water and not water to acid while diluting a concentrated acid?

**Ans:** The process of dissolving a concentrated acid in water is highly exothermic. If water is added to acid, the large amount of heat generated can cause the mixture to splash out, causing burns, and may even break the glass container.

2. How does using baking soda in a cake batter make it soft and spongy?

**Ans:** When baking soda is heated or mixed in water, carbon dioxide produced during the reaction causes bread or cake to rise making them soft and spongy.

3. What happens when water is added to quick lime?

**Ans:** When water is added to quick lime, slaked lime and heat are formed.

4. How does the flow of acid rain into a river affect the aquatic life? (or) How does the flow of acid rain into a river make the survival of aquatic life in a river difficult

**Ans:** When pH of rain water is less than 5.6, it is called acid rain. When acid rain flows in to the rivers, it lowers the pH of the river water, the survival of aquatic life in such rivers becomes difficult.

5. Why do acids not show acidic behaviour in the absence of water?

**Ans:** Acids can only produce hydrogen ions ( $H^+$ ), when they are dissolved in water. In the absence of water, an acid does not dissociate to release  $H^+$  ions, and therefore, it does not show any acidic properties.

## 1 Mark Questions

1. Write the bleaching power formula.

**Ans:**  $CaOCl_2$

2. Write the Plaster of Paris formula.

**Ans:**  $CaSO_4 \cdot \frac{1}{2} H_2O$

3. Write the gypsum formula.

**Ans:**  $CaSO_4 \cdot 2H_2O$

4. Name the substance which on treatment with chlorine yields bleaching powder.

**Ans:** Dry slaked lime (or)  $Ca(OH)_2$

5. Which gas is released on the reaction of zinc granules with dilute sulphuric acid. (or) Which gas is produced when acids react with metals?

**Ans:** Hydrogen or  $H_2$

6. Which gas evolves, when metal carbonate or metal hydrogen carbonate react with acids

**Ans:** Carbon dioxide or  $CO_2$

7. What is the range of pH scale?

**Ans:** 0 – 14

8. What is pH value of a neutral solution?

**Ans:** 7

9. What types of medicines is used for treating indigestion?

**Ans:** Antacid

10. Write an equation for the reaction between acid and base.

**Ans:** Acid + Base  $\rightarrow$  Salt + Water

11. What happens when acids react with metals?

**Ans:** Hydrogen gas is evolved.

12. Name the sodium compound which is used for softening hard water.

**Ans:** Washing soda (or) sodium carbonate.

13. What does a pH value less than 7 indicate?

**Ans:** An acidic solution.

14. Why are toothpastes generally basic?

**Ans:** Toothpaste neutralise the excess acid and prevent tooth decay.

15. What happens when Plaster of Paris is mixed with water?

**Ans:** It changes into a hard mass of gypsum.

16. How many molecules of water of crystallisation are there in Washing soda crystals.

**Ans:** 10

## Chapter – 10: The Human Eyes and The Colourful World

### 8 Marks Questions

1. Explain the following.

a) Scattering of light   b) Dispersion of light   c) Presbyopia   d) Power of accommodation of eye lens

**Ans:** a) Scattering of light

i) The blue colour of the sky, colour of water in deep sea, the reddening of the sun at sunrise and the sunset are some of the wonderful phenomena.

ii) The scattering of light by colloidal particles. The path of a beam of light passing through a true solution is not visible. However, its path becomes visible through a colloidal solution where the size of the particles is relatively larger.

b) Dispersion of light

i) The splitting of white light into its component colours is called dispersion of light.

ii) The various colours seen are Violet, Indigo, Blue, Green, Yellow, Orange and Red.

c) Presbyopia

i) The defect of find it difficult to see nearby objects comfortably and distinctly without corrective eye-glasses are called Presbyopia.

ii) This defect can be corrected by using bi-focal lenses.

d) Power of accommodation of eye lens

i) The power of accommodation of the eye is the maximum variation of its power for focusing on near and far objects.

ii) For a normal eye, the power of accommodation is about 4 dioptries.



**2. Explain the following.****a) Ciliary muscles****b) Atmospheric refraction****Ans: a) Ciliary muscles**

- i) The change in the curvature of the eye lens can thus change its focal length.
- ii) When the ciliary muscles are relaxed, the lens becomes thin. Thus, its focal length increases. This enables us to see distant objects clearly.
- iii) When the ciliary muscles contract, the lens becomes thicker. Thus, its focal length decreases. This enables us to see nearby objects clearly.

**b) Atmospheric refraction**

The air just above the fire becomes hotter than the air further up. The hotter air is lighter (less dense) than the cooler air above it, and has a refractive index slightly less than that of the cooler air. Since the physical conditions of the refracting medium (air) are not stationary, the apparent position of the object, as seen through the hot air, fluctuates. This wavering is thus an effect of atmospheric refraction on a small scale in our local environment. The twinkling of stars is a similar phenomenon on a much large scale.

**1 Mark Questions****1. The condition of the crystalline lens of old age people becomes milky and cloudy is called \_\_\_\_\_****Ans:** cataract.**2. Myopia is also known as \_\_\_\_\_****Ans:** near sightedness.**3. What is the other name of near sightedness?****Ans:** Myopia**4. How is Myopia or near sightedness corrected?****Ans:** By using Concave lens**5. Hypermetropia is also known as \_\_\_\_\_****Ans:** far sightedness**6. What is the other name of long sightedness?****Ans:** Hypermetropia**7. How is Hypermetropia or long sightedness corrected?****Ans:** By using Convex lens**8. What type of image formed by the eye lens?****Ans:** Real and inverted image**9. A rainbow is formed due to \_\_\_\_\_****Ans:** dispersion**10. Twinkling of stars due to \_\_\_\_\_****Ans:** Atmospheric refraction**11. The blue colour of sky due to \_\_\_\_\_****Ans:** Scattering of light**12. The phenomenon of scattering of light by the colloidal particles gives rise to \_\_\_\_\_****Ans:** Tyndall effect**13. What is diameter of eye?****Ans:** 2.27 cm**14. Danger signals lights are red in colour. Why?****Ans:** Red light has the longest wavelength, making it scattered the least by the atmosphere.



## Chapter – 3: Metals and Non-metals

### 8 Marks Questions

#### 1. Describe an activity on metals react with water (Action of steam on a metal)

**Ans:**

**Aim:** Observe the reactions of different metals with water.

**Required Materials:** Different metals, Stands, Burner, Test tube, Delivery tube, Glass jar.

**Procedure:** i) Collect the samples of some metals

ii) Put small pieces of the samples separately in beakers half-filled with cold water.

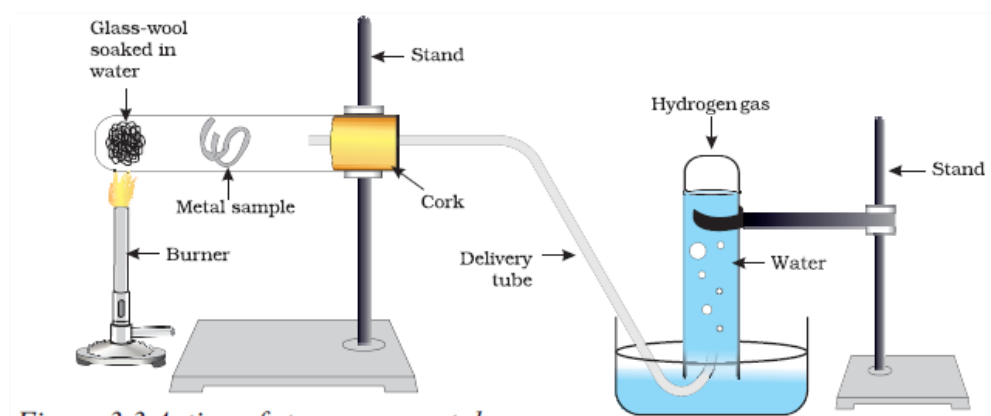
iii) The reactivity of metals with cold water increasing in order is  $Mg < Ca < Na < K$

iv) Sodium and Potassium catch fire on water

v) Calcium starts floating after some time.

vi) Put the metals that did not react with cold water in beakers half - filled with hot water.

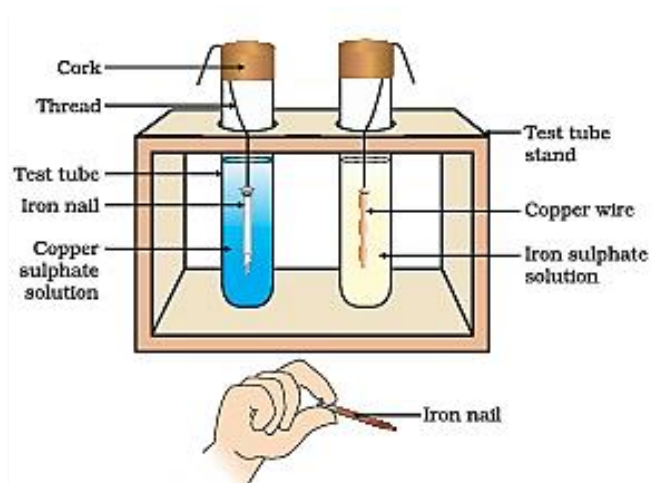
vii) Copper, Silver and Gold metals did not react even with steam.



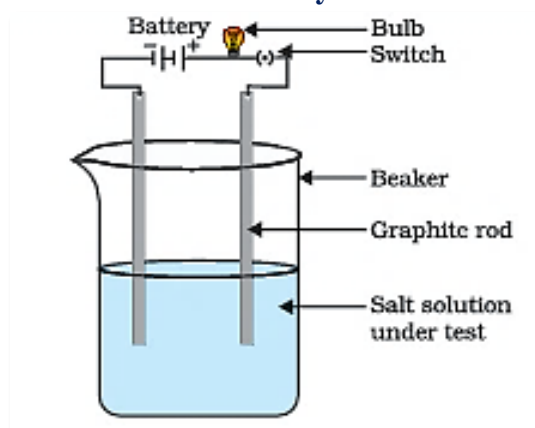
**Observations:** Lead, Copper, Silver and Gold metals do not react with water at all.

### 4 Marks Questions

#### 1. Draw a neat diagram to show that high reactive metals displace low reactive metals from their compounds. (or) Draw a neat diagram to show that metals react with solutions of other metal salts.

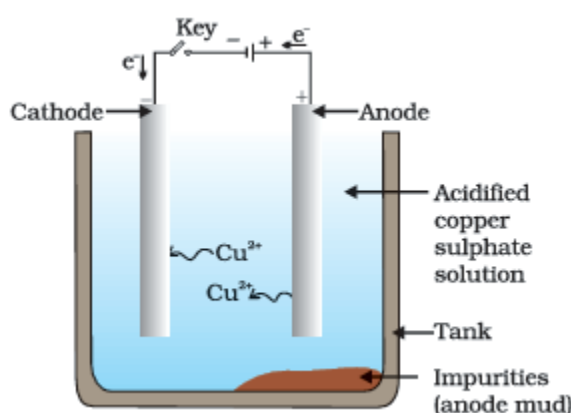


2. Draw a neat diagram to show the electric conductivity of a salt solution



3. Draw a neat diagram to show the electrolytic refining of copper.

**Ans:**



**4 Marks Questions**

1. Write any four uses of refining of metals.

- Ans:** i) Purification for industrial applications.  
 ii) Jewellery and decorative items.  
 iii) Manufacture of electrical and electronics components.  
 iv) Production of high-strength alloys.

2. Explain, how each of these observations helps the student conclude that the substance is an ionic compound (Properties of Ionic Compounds)

- Ans:** (i) Physical nature: Ionic compounds are solids and are somewhat hard.  
 (ii) Melting and Boiling points: Ionic compounds have high melting and boiling  
 (iii) Solubility: Electrovalent compounds are generally soluble in water and insoluble in solvents  
 (iv) Conduction of Electricity: A solution of an ionic compound of conduction of electricity.

**1 Mark Questions**

1. Give an example of a metal which is a liquid at room temperature.

**Ans:** Mercury

2. Give an example of a metal which can be easily cut with a knife.

**Ans:** Sodium

3. Give an example of a metal which is the best conductor of heat.

**Ans:** Silver and copper

4. Give an example of a metal which is a poor conductor of heat.

**Ans:** Lead and mercury.

**5. Write any one physical property of metals.**

**Ans:** Metallic lustre, Malleability, Ductility, Good conductors of heat and electricity (Any One)

**6. What are amphoteric oxides?**

**Ans:** Oxides which react both with acids as well as bases to form salts and water are known as amphoteric oxides.

**7. Write any one of ways or method to prevent the rusting of iron or corrosion.**

**Ans:** Painting oiling or greasing

**8. What type of oxides are formed when non-metals combine with oxygen?**

**Ans:** Acidic oxides

**9. Which metals do not corrode easily?**

**Ans:** Gold, Platinum

**10. Write any one general properties of ionic compounds?**

**Ans:** High melting and boiling points (or) Soluble in water.

**11. Name two metals which are found in nature in the free state.**

**Ans:** Gold, Platinum

**12. What chemical process is used for obtaining a metal from its oxide?**

**Ans:** Reduction

**13. Give one example of amphoteric oxides?**

**Ans:** Aluminium oxide and zinc oxide

**14. Name a non-metal which is lustrous.**

**Ans:** Iodine

**15. Name two metals both of which are very ductile as well as very malleable.**

**Ans:** Gold and silver

**16. Which metal is the most reactive according to the activity series table?**

**Ans:** Potassium (K)

**17. Name the least reactive metal shown in the activity series table.**

**Ans:** Gold (Au).

**18. Which of the following are not ionic compounds**

i) NaCl

ii) CCl<sub>4</sub>

iii) KCl

iv) HCl

a) i) and ii)

b) ii) and iii)

c) ii) and iv)

d) iii) and iv)

**Ans:** c) ii) and iv)

**19. Aqua regia means**

a) 3:1 of Conc. HCl, Conc. HNO<sub>3</sub>

b) 1:3 of Conc. HCl, Conc. HNO<sub>3</sub>

c) 3:1 of Dil. HCl, Dil. HNO<sub>3</sub>

d) 1:3 of Dil. HCl, Dil. HNO<sub>3</sub>

**Ans:** a) 3:1 of Conc. HCl, Conc. HNO<sub>3</sub>

**20. Bronze is an alloy of \_\_\_\_**

a) Cu and Zn

b) Al and Sn

c) Cu, Sn and Zn

d) Cu and Sn

**Ans:** d) Cu and Sn

**21. The reducing agent in thermite process is \_\_\_\_**

a) Al

b) Mg

c) Fe

d) Si

**Ans:** a) Al

**22. Arrange the metals Fe, Na, Ag and Zn in increasing order of Reactive series.**

**Ans:** Ag < Fe < Zn < Na

**23. Give any two examples for non-metals.**

**Ans:** Oxygen, Sulphur, Nitrogen, Carbon etc.



## Chapter – 11: Electricity

### 8 Marks Questions

#### 1. Write the differences between resistance and resistivity.

**Ans:**

Resistance	Resistivity
1. The obstruction to the motion of the electrons in a conductor is known as Resistance	1. The resistance of a conductor of unit length and unit area of cross section is called Resistivity
2. It is denoted by 'R'	2. It is denoted by 'ρ'
3. S.I unit is ohm(Ω)	3. S.I unit is ohm-metre(Ω-m)
4. $R = \rho l / A$	4. $\rho = RA / l$
5. It depends on nature of the material, length, area of cross section and temperature	5. It depends on nature of the material and temperature

#### 2. Derive $H = I^2 R t$

**Ans:** Consider a current 'I' flowing through a resistor of resistance 'R'. Let the potential difference across it be 'V' and 't' be the time during which a charge 'Q' flows across.

The amount of charge,  $Q = It$  ----- (1)

By the definition of potential difference  $V = W/Q$

$$W = VQ \text{ ----- (2)}$$

From (1) & (2)

$$W = VIt$$

The energy gets dissipated in the resistor as heat, then the amount of heat produced is

$$H = VIt$$

Applying Ohm's law

$$H = I^2 R t$$

### 2 Marks Questions

#### 1. What happens to the resistivity of a conductor if its length is doubled?

**Ans:** No change in the resistivity. Because it depends on the nature of conductor.

#### 2. What happens to the resistance of conductor if its length is double and area of cross-section is halved?

**Ans:** 4 times increased. Because resistance of conductor is directly proportional to its length and inversely proportional to the area of cross-section.

#### 3. What happens to the potential difference across a combination of resistors in series?

**Ans:** The total potential difference (V) across a combination of resistors connected in series is equal to the sum of the potential differences across each individual resistor.

#### 4. Why are alloys commonly used in electrical heating devices?

**Ans:** Alloys resistivity is high and they do not oxidize readily at high temperatures.

#### 5. What would happen to the current if the potential difference across a component is halved while its resistance remains constant?

**Ans:** If the potential difference is halved, then the current flowing through the component will also be halved.

#### 6. What happens to the current in a series circuit?

**Ans:** In a series combination of resistors, the current is the same in every part of the circuit.

#### 7. What is effective resistance of parallel combination of two 10 Ω resistors?

**Ans:**  $R_1 = 10 \Omega$ ,  $R_2 = 10 \Omega$

$$R = \frac{R_1 \times R_2}{R_1 + R_2} = \frac{10 \times 10}{10 + 10} = \frac{100}{20} = 5 \Omega$$

#### 8. What are the working principles of electric fuse?

**Ans:** An electric fuse works on the heating effect of electric current, using a thin metal wire with a low melting point and breaks a circuit when excessive current flows.

## 1 Mark Questions

1. On what factors does the resistance of a conductor depend?

**Ans:** Length, Area of cross-section, nature of the material.

2. How can we measure the potential difference across the ends of a conductor?

**Ans:** Voltmeter

3. What determines the rate at which energy is delivered by a current?

**Ans:** Electric power

4. Calculate the number of electrons constituting one coulomb of charge. (or)

How many electrons are contained in one coulomb of charge?

**Ans:**  $6.25 \times 10^{18}$  electrons.

5. Which device can protect the home appliances from the high current?

**Ans:** Fuse

6. Which metal is used almost exclusively for filaments of electric bulbs?

**Ans:** Tungsten

7. What is the function of a fuse in an electric circuit?

**Ans:** A fuse protects circuits and appliances by stopping the flow of any high electric current.

8. What is the lowest total resistance possible with four coils of  $4\Omega$ ,  $8\Omega$ ,  $12\Omega$ ,  $24\Omega$ ?

**Ans:**  $2\Omega$

9. What is the highest total resistance possible with four coils of  $4\Omega$ ,  $8\Omega$ ,  $12\Omega$ ,  $24\Omega$ ?

**Ans:**  $48\Omega$

10. What will be the resistance of a new wire if the original wire of  $4\Omega$  is made twice as thick?

**Ans:** The resistance of the new wire will be  $1\Omega$ .

11. How much energy is given to each coulomb of charge passing through a 6V battery?

**Ans:** Each coulomb of charge is given 6 joules of energy.

12. Write the formula for electric current in terms of charge and time.

**Ans:**  $I = \frac{Q}{t}$

13. Express mathematically the potential difference.

**Ans:**  $V = \frac{W}{q}$

14. Write the mathematical expression for Ohm's law?

**Ans:**  $V = IR$

15. State the expression for the equivalent resistance of resistors in series.

**Ans:**  $R = R_1 + R_2 + R_3$

16. State the expression for the equivalent resistance of resistors in parallel.

**Ans:**  $1/R = 1/R_1 + 1/R_2 + 1/R_3$  (or)  $R = \frac{R_1 R_2 R_3}{R_1 R_2 + R_2 R_3 + R_3 R_1}$

17. Write a formula for electric power in terms of voltage and current.

**Ans:**  $P = VI$

18. Which material is the best conductor of electricity?

**Ans:** Silver is the best conductor of electricity.

19. What are the factors on which the heat produced in a wire depends?

**Ans:** Two factors are (a) material of the wire and (b) the resistance,

20. When do we say that the resistors are connected in series?

**Ans:** The current through each resistor is same

21. When do we say that the resistors are connected in parallel?

**Ans:** The potential difference across each resistor is same.

22. If two resistors of  $6\Omega$  and  $12\Omega$  were given to you, then how do you connect them to get  $4\Omega$  as resultant resistance.

**Ans:** Parallel connection.

23. How can three resistors of resistances  $2\Omega$ ,  $3\Omega$  and  $6\Omega$  be connected to give a total resistance of  $11\Omega$ ?

**Ans:** Series connection.

**24. How can three resistors of resistances  $2\ \Omega$ ,  $3\ \Omega$ , and  $6\ \Omega$  be connected to give a total resistance of  $1\ \Omega$ ?**

**Ans:** Parallel connection.

**25. Which is having more resistance a  $220\ \text{V}$ ,  $100\ \text{W}$  bulb or a  $220\ \text{V}$ ,  $60\ \text{W}$  bulb?**

**Ans:**  $60\ \text{W}$  bulb.

**27. How many electrons constitute one coulomb of charge?**

**Ans:**  $6.24 \times 10^{18}$  electrons

**28. fuse wire always connected in \_\_\_\_\_ the household appliances.**

**Ans:** Series

**29. Which property of the conductor that resistance the flow of electric charge?**

**Ans:** Resistance

**30. What is the function of rheostat in the electric circuit?**

**Ans:** Variable resistor (or) Adjusting voltage (or) Controlling current

## Chapter – 4: Carbons and its Compounds

### 8 Marks Questions

**1. Explain the following**

**i) Homologous series      ii) Substitution reaction**

**Ans: i) Homologous series**

A series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called a homologous series.

A series in which every succeeding compound differs from the previous one by  $-\text{CH}_2$ .

Example:  $\text{CH}_4$ ,  $\text{C}_2\text{H}_6$ , .... is the alkane homologous series.

**ii) Substitution reaction**

One type of atom or a group of atoms takes the place of another is called a substitution reaction

Example: In the presence of sunlight, chlorine is added to hydrocarbons in a very fast reaction. Chlorine can replace the hydrogen atoms one by one. A number of products are usually formed with the higher homologues of alkanes.



**2. How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties? (or) How would you distinguish experimentally between an alcohol and a carboxylic acid?**

**Ans: Physical properties:**

i) Smell: Ethanol has a pleasant smell. Ethanoic acid has pungent smell.

ii) Melting point: Melting point of ethanol is very lower than ethanoic acid.

iii) Boiling point: Boiling point of ethanol is very lower than ethanoic acid.

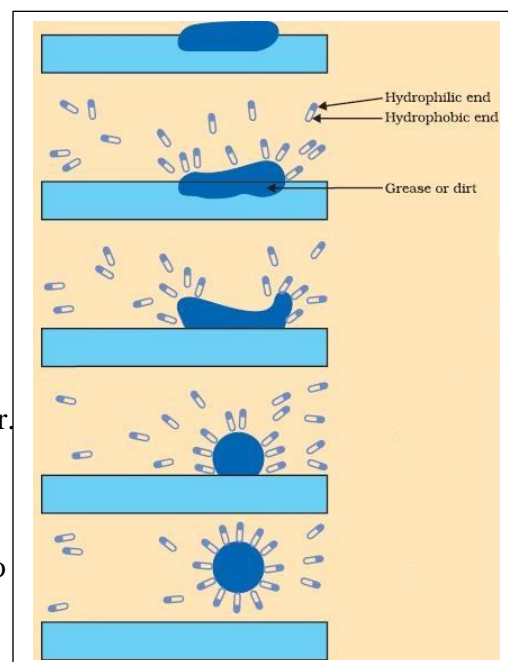
**Chemical properties:**

Ethanol	Ethanoic acid
It is a neutral compound	It is an acidic compound
It does not reaction with metal carbonates	It reacts with metal carbonates to form salt, water and carbon dioxide
It does not give Brisk effervescence	It gives Brisk effervescence
It is oxidized	It is not oxidized



### 3. Explain the cleaning action of soap (or) Explain the mechanism of the cleaning action of soaps?

- Ans:**
- Soaps are molecules in which the two ends have differing properties, one is hydrophilic, that is, it interacts with water, while the other end is hydrophobic, that is, it interacts with hydrocarbons.
  - When soap is at the surface of water, the hydrophobic 'tail' of soap will not be soluble in water and the soap will align along the surface of water with the ionic end in water and the hydrocarbon 'tail' protruding out of water.
  - Inside water, these molecules have a unique orientation that keeps the hydrocarbon portion out of the water.
  - Thus, clusters of molecules in which the hydrophobic tails are in the interior of the cluster and the ionic ends are on the surface of the cluster.
  - This formation is called a micelle. Soap in the form of a micelle is able to clean, since the oily dirt will be collected in the centre of the micelle.
  - The micelles stay in solution as a colloid and will not come together to precipitate because of ion-ion repulsion.
  - Thus, the dirt suspended in the micelles is also easily rinsed away.



### 4. Write the differences between soaps and detergents

**Ans:**

Soaps	Detergents
Chemically, soaps are sodium or potassium salts of higher fatty acids.	Chemically, detergents are sodium salts of sulphonic acids.
Soaps are dissolve in water	Detergents are dissolve in water
Soaps are easily biodegradable	Detergents are not easily biodegradable
Soaps have relatively weak cleaning agents	Detergents have a strong cleaning agents
Soaps are natural derivatives	Detergents are derivatives
Soaps are not effective in hard water	Detergents do not lose their effectiveness in hard water.

### 2 Marks Questions

#### 1. Differentiate between an alcohol and carboxylic acid chemically.

**Ans:**

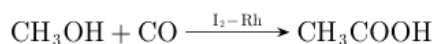
Alcohol	Carboxylic acid
No change in colour of litmus solution.	Turns blue litmus red.
No brisk effervescence	Brisk effervescence

#### 2. Explain how carbon's tetravalency contributes to its versatile nature.

**Ans:** Carbon has a valency of four, making it capable of bonding with four other atoms. This allows it to form a vast array of compounds with elements like hydrogen, oxygen, nitrogen, and sulphur.

#### 3. How is ethanoic acid prepared commercially?

**Ans:** Ethanoic acid is prepared by the reaction between methanol and carbon monoxide in the presence of iodine-rhodium as catalysts.



#### 4. Explain the nature of the covalent bond using the bond formation in $\text{CH}_3\text{Cl}$ .

**Ans:** Covalent bonds are formed by sharing of electrons so that the combining atoms complete their outermost shell. Three C – H covalent bonds, One C – Cl covalent bonds.

#### 5. Explain the formation of scum when hard water is treated with soap.

**Ans:** Hard water contains hydrogen carbonates, chlorides and sulphates of calcium and magnesium which react with soap to form scum.

**6. Why does micelle formation take place when soap is added to water?**

**Ans:** Soap molecules have both a hydrophilic head and a hydrophobic tail. In, water these molecules arrange themselves with the hydrophobic tails clustering together in the center, forming a spherical structure called a micelle.

**7. Why are carbon and its compounds used as fuels for most applications?**

**Ans:** Carbon and its compounds give a large amount of heat energy and light is released. So, it's used as fuels for most applications.

### 1 Mark Questions

**1. Which of the flowing hydrocarbon undergoes addition reaction?**

- A)  $C_2H_6$                       B)  $C_3H_8$                       C)  $CH_4$                       D)  $C_3H_6$

**Ans:** D)  $C_3H_6$

**2. Which of the flowing hydrocarbon undergoes substitution reaction?**

- A)  $C_2H_4$                       B)  $C_5H_{10}$                       C)  $C_4H_{10}$                       D)  $C_3H_6$

**Ans:** C)  $C_4H_{10}$

**3. Identify the alkane**

- A)  $C_2H_4$                       B)  $C_5H_{10}$                       C)  $CH_4$                       D)  $C_2H_2$

**Ans:** C)  $CH_4$

**4. Formula of Alcohol functional group is**

- A)  $-OH$                       B)  $-CHO$                       C)  $-CO-$                       D)  $-COOH$

**Ans:** A)  $-OH$

**5. Formula of Aldehyde functional group is**

- A)  $-OH$                       B)  $-CHO$                       C)  $-CO-$                       D)  $-COOH$

**Ans:** B)  $-CHO$

**6. Formula of Ketone functional group is**

- A)  $-OH$                       B)  $-CHO$                       C)  $-CO-$                       D)  $-COOH$

**Ans:** C)  $-CO-$

**7. Formula of Carboxylic acid functional group is**

- A)  $-OH$                       B)  $-CHO$                       C)  $-CO-$                       D)  $-COOH$

**Ans:** D)  $-COOH$

**1. Ethane, with the molecular formula  $C_2H_6$  has**

- A) 6 covalent bonds                      B) 7 covalent bonds                      C) 8 covalent bonds                      D) 9 covalent bonds

**Ans:** B) 7 covalent bonds

**2. Butanone is a four-carbon compound with the functional group**

- A) carboxylic acid                      B) aldehyde                      C) ketone                      D) alcohol.

**Ans:** C) ketone

**3. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that**

- A) the food is not cooked completely                      B) the fuel is not burning completely  
C) the fuel is wet                      D) the fuel is burning completely

**Ans:** B) the fuel is not burning completely

**4. The by-product of soap is**

- A) Isoprene                      B) Glycerol                      C) Butene                      D) Ethylene glycol

**Ans:** B) Glycerol

**5. Vinegar is a solution of**

- A) 30% – 40% acetic acid in alcohol                      B) 5% – 8% acetic acid in alcohol  
C) 5% – 8% acetic acid in water                      D) 15% -20% acetic acid in water

**Ans:** C) 5% – 8% acetic acid in water

6. How many carbon atoms are present in one molecule of ethanol?

A) One

B) Two

C) Three

D) Four

**Ans:** B. Two

7. 100% pure ethanol is called

A) Rectified spirit

B) Absolute alcohol

C) Denatured alcohol

D) Power alcohol

**Ans:** B) Absolute alcohol

8. What does carbon burn in oxygen to produce?

**Ans:** Carbon dioxide, heat, and light.

9. What reaction is used in the hydrogenation of vegetable oils?

**Ans:** An addition reaction.

10. What is the general formula for alkenes?

**Ans:**  $C_n H_{2n}$

11. What type of reaction occurs when chlorine is added to hydrocarbons in sunlight?

**Ans:** A substitution reaction.

12. What is the common name for ethanol?

**Ans:** Alcohol.

13. What gas evolves when alcohols react with sodium?

**Ans:** Hydrogen.

14. What is the common name for ethanoic acid?

**Ans:** Acetic acid

15. What reaction forms esters?

**Ans:** The reaction of an acid and an alcohol forms esters.

16. What is the valency of carbon?

**Ans:** Four

17. Would you be able to check if water is hard by using a detergent?

**Ans:** No, because detergent is equally effective in hard water as well soft water.

18. How many structural isomers can you draw for pentane?

**Ans:** 3 structural isomers.

19. Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

**Ans:** Ethanol has only one oxygen atom whereas ethanoic acid has two oxygen atoms. As addition of oxygen is called as oxidation, so conversion of ethanol to ethanoic acid is an oxidation reaction.



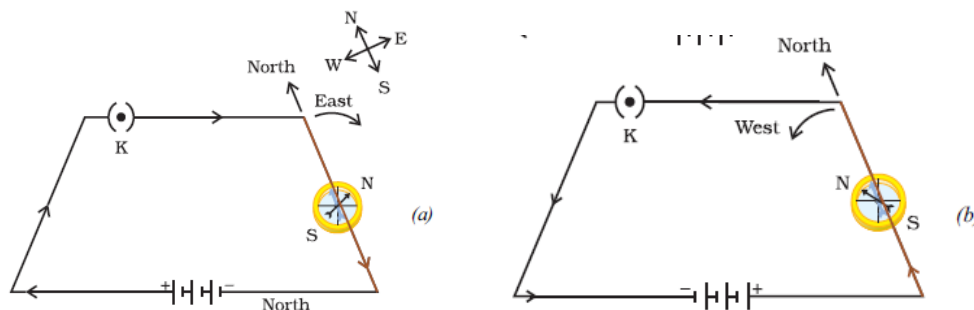
## Chapter – 12: Magnetic Effects of Electric Current

### 8 Marks Questions

**1. Describe an activity to show the direction of magnetic lines produced by a current-carrying conductor.**

**Ans: Aim:** To show the direction of magnetic lines produced by a current-carrying conductor.

**Required Materials:** Long straight copper wire, Battery, Plug key, Magnetic compass.

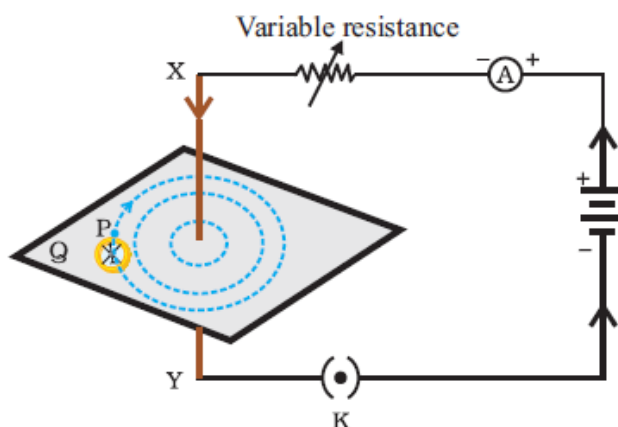


- Procedure:**
1. Take a long straight copper wire, two or three cells of 1.5 V each, and a plug key.
  2. Connect all of them in series as shown in (a).
  3. Place the straight wire parallel to and over a compass needle.
  4. Plug the key in the circuit.
  5. Observe the direction of deflection of the north pole of the needle. If the current flows from north to south, as shown in Fig. (a), the north pole of the compass needle would move towards the east.
  6. Replace the cell connections in the circuit as shown in Fig. (b). This would result in the change of the direction of current through the copper wire, that is, from south to north.
  7. Observe the direction of deflection of the south pole of the needle. If the current flows from south to north, as shown in Fig. (b), the south pole of the compass needle would move towards the west.

**4. Write an activity to show the shape and direction of the magnetic field lines around a current carrying straight conductor.**

**Ans: Aim:** To study the magnetic field lines around a straight current carrying straight conductor.

**Required materials:** Battery, Variable resistance, Ammeter, Plug key, Thick copper wire, Cardboard, Iron filings.



- Procedure:**
1. As shown in the figure, connecting the circuit.
  2. Insert the thick wire through the centre, normal to the plane of a rectangular cardboard. Take care that the cardboard is fixed and does not slide up or down.
  3. Connect the copper wire vertically between the points X and Y, as shown in Fig. (a), in series with battery, a plug and key.
  4. Sprinkle some iron filings uniformly on the cardboard.







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