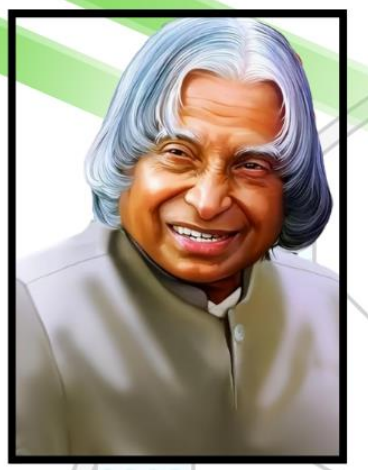
Lakshyam



Handbook

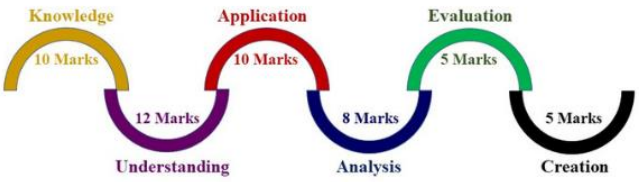
PHYSICAL SCIENCE

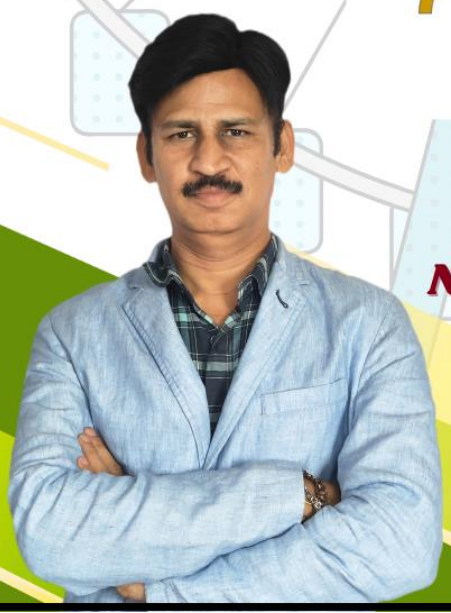
SSC PUBLIC EXAMINATIONS - 2026

"This book Transforms Doubts into Concepts and Efforts into Results!"

Chapter wise Weightage

Chemical Reactions and Equations	Light- Reflection and Refraction	Acids, Bases and Salts	Human Eye and Colourful World	Metals and Non-metals	Electricity	Carbon and its Compounds	Magnetic Effects of Electric Current
9 Marks	11 Marks	10 Marks	9 marks	9 marks	11 Marks	11 Marks	8 Marks





Midde Srinivasa Rao
SA(Physics)
National Teacher Awardee - 2024
S.P.S.M.High School Plus
Gudivada
ph: 9848143855
Visit: srini science mind

1. Chemical Reactions and Equations

Structure: 1(8 Marks) + 1(1 Mark) = 9 Marks

Section -1	1 Mark Questions	Q.No: 1 - 8

1. A magnesium ribbon is burnt in the presence of Oxygen to give Magnesium oxide. Rewrite the above reaction as Chemical equation.

Ans: $2Mg + O_2 \rightarrow 2MgO$

2. Suggest one method to prevent corrosion.

Ans: Painting or Oiling or Greasing

3. Predict, Exhalation air is hotter than Inhalation air in respiration process.

Ans: Exhalation air is hotter than Inhalation air because it absorbs heat from the respiratory system and the body during gas exchange.

4.Why do we apply paint on iron articles?

Ans: By applying paint on iron articles, they can be prevented from corrosion. Paint does not allow air and moisture to come in contact with the surface of iron.

5. Why, keeping food in air tight containers?

Ans: Oxidation of food can be slow down.

6. Why does the colour of copper sulphate solution change when an iron nail is dipped on it?

Ans: When an iron nail is dropped in blue colour of Copper sulphate solution. Iron is more active than Copper and Copper displaces by iron.

7. Why is respiration considered an exothermic reaction?

Ans: During digestion, food (carbohydrates) is broken down into glucose. During respiration, glucose is oxidized and liberated CO_2. So, respiration is an exothermic process.

8. What happened when iron nail is exposed in air or atmosphere? Predict

Ans: Iron reacts with oxygen and moisture, forming iron oxide (rust)

9. Oil and fat containing food items are flushed with nitrogen. Why?

Ans: Avoid rancidity because oil and fat containing food items are oxidised, they become rancid and their smell and taste change. So, oil and fat containing food items are flushed with nitrogen.

10. Why hydrogen peroxide is kept in coloured bottle?

Ans: In the presence of light, hydrogen peroxide decomposes into water and oxygen. So it is kept in coloured bottle.

11. Why do silver, gold and platinum not corrode in moist air?

Ans: They have very low in the reactivity series of metals.

12. Why is photosynthesis considered an endothermic reaction?

Ans: Photosynthesis is an endothermic reaction as it takes energy from sun or light.

13. Why cannot we stir silver nitrate solution with copper spoon?

Ans: Because copper is more reactive than silver.

14. Why should a magnesium ribbon be cleaned before burning in air?

Ans: Magnesium is metal and formation of white layer of magnesium oxide on its surface.

15. Name one observation that helps determine if a chemical reaction has occurred.

Ans: An evolution of a gas helps determine that a chemical reaction has occurred.

16. What is the new substance formed during a chemical reaction called?

Ans: The new substance formed during a reaction is called a product.

17. State the law of conservation of mass in a chemical reaction.

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

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

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

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

Ans: Decomposition reaction.

20. What type of reaction occurs when an iron nail is placed in copper sulphate solution?
Ans: A displacement reaction
21. What is the general term for the process where a metal is attacked by moisture or acids?
Ans: Corrosion.
22. 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.
23. Name two effects of oxidation in daily life.
Ans: (i) Corrosion (ii) Rancidity
24. Name the gas that can be used for storage of fresh sample of chips for a long time.
Ans: Nitrogen.
25. What type of reaction takes place during respiration?
Ans: Exothermic reaction
26. Write two conditions of corrosion.
Ans: (i) Presence of moisture. (ii) Presence of air (oxygen).

Section -1V	8 Marks Questions	Q.No: 16

1. Explain the following with an example.
i) Chemical combination ii) Chemical decomposition
iii) Chemical displacement iv) Chemical double displacement
(or)
State and explain four types of chemical reactions with an example each.

Ans: i) Combination reaction: A reaction in which a single product is formed from two or more reactants is known as a combination reaction.
Ex: Calcium oxide reacts vigorously with water to produce slaked lime.

$$CaO + H_2O \rightarrow Ca(OH)_2$$

ii) Decomposition reaction: A reaction in which a single substance decomposes to give two or more substances is known as decomposition reaction.
Ex: Decomposition of calcium carbonate to calcium oxide and carbon dioxide on heating.

$$CaCO_3 \xrightarrow{heat} CaO + CO_2$$

iii) Displacement reaction: The reaction in which an element has displaced or removed another element from the molecule is called displacement reaction.
Ex: Iron has displaced another element copper from copper sulphate solution.

$$Fe + CuSO_4 \rightarrow FeSO_4 + Cu$$

iv) Double displacement reaction: The reaction in which there is an exchange of ions between the reactants are called double displacement reactions.
Ex: Sodium sulphate and Barium chloride are reacting and exchange their ions.

$$Na_2SO_4 + BaCl \rightarrow BaSO_4 + 2NaCl$$

2. Balance the following chemical equations
i) $HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + H_2O$
ii) $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$
iii) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$
iv) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + HCl$

Ans: (i) $HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + H_2O$
$2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$
(ii) $NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$
$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$
(iii) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$
$NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$
(iv) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + HCl$
$BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

3. Balance the following chemical equations

i) $Fe + H_2O \rightarrow Fe_3O_4 + H_2$

ii) $Pb(NO_3)_2 \rightarrow PbO + NO_2 + O_2$ (on heating)

iii) $CH_4 + O_2 \rightarrow CO_2 + H_2O$

iv) $Zn + HCl \rightarrow ZnCl_2 + H_2$

Ans: i) $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$

ii) $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$

iii) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

iv) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

4. Write the balanced chemical equations for the following reactions.

(a) Calcium hydroxide + Carbon dioxide → Calcium carbonate + Water

(b) Zinc + Silver nitrate → Zinc nitrate + Silver

(c) Aluminium + Copper chloride → Aluminium chloride + Copper

(d) Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride

Ans: (a) Calcium hydroxide + Carbon dioxide → Calcium carbonate + Water

$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

(b) Zinc + Silver nitrate → Zinc nitrate + Silver

$Zn + 2AgNO_3 \rightarrow Zn(NO3)_2 + 2Ag$

(c) Aluminium + Copper chloride → Aluminium chloride + Copper

$2Al + 3CuCl_2 \rightarrow 2AlCl_3 + 3Cu$

(d) Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride

$BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2KCl$

5.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: $Mg (s) + 2HCl (aq) \rightarrow MgCl_2 (aq) + H_2 (g)$	$NaSO_4(aq) + BaCl(aq) \rightarrow BaSO_4 (s) + 2 NaCl(aq)$

6. 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.

$2Cu + O_2 \rightarrow 2CuO$ (Cu is oxidized to CuO)

$2Mg + O_2 \rightarrow 2MgO$ (Mg is oxidized to MgO)

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

$ZnO + C \rightarrow Zn + CO$ (ZnO is reduced to Zn)

$CuO + H_2 \rightarrow Cu + H_2O$ (CuO is reduced to Cu)

9. Light - Reflection and Refraction

Structure: 2(4 Marks) + 1(2 Marks) + 1(1 Mark) = 11 Marks

Section -1	1 Mark Questions	Q.No: 1 - 8

1. The radius of curvature of a spherical mirror is given as 20 cm then Determine it's focal length.

Ans: Focal length of a spherical mirror (f) = $\frac{R}{2} = \frac{20}{2}$ = 10 cm

2. Find the Power of a Convex lens having a focal length of 50cm.

Ans: Focal length of a convex lens (f) = 50 cm = 0.5 m

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

3. Find the focal length of a lens of power – 2.0 D?

Ans: Power of lens (P) = - 2.0 D

Focal length of the lens (f) = $\frac{1}{R} = \frac{1}{-2} = -0.5\ m$

4. A doctor has prescribed a corrective lens of power +1.5 D. Find the focal length of the lens.

Ans: Power of lens (P) = + 1.5 D

Focal length of the lens (f) = $\frac{1}{R} = \frac{1}{1.5} = \frac{10}{15} = 0.6667\ m = +66.67\ cm$

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

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

6. 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 D

7. 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

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

Ans: Convex lens.

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

Ans: Diverging lens.

10. 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.

11.What is the net power of two lenses of power +2.0 D and +0.25 D placed in contact?

Ans: The net power is +2.25 D.

Section -II	2 Marks Questions	Q.No: 9 - 11

1. Predict and Write about the world without lenses

Ans: In a world without lenses, vision correction, photography and scientific exploration would be impossible. Humans would rely on alternative tools to compensate for impaired vision and optical challenges.

2. A ray of light travelling in air enters obliquely into water. Predict and write weather 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.

3. Why do we prefer a convex mirror as a rear-view mirror in vehicles?

Ans: Convex mirror always forms virtual, erect and diminished images irrespective of distance of the object and also enables a driver to view large area of the traffic behind him.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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 $\angle I = \angle r = 0^0$

10. 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.

11. 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.

12. Write any two applications of lenses.

Ans: Lenses are commonly used in vision correction, Magnifying objects, photography and Medical equipment.

13. List two important uses of concave mirrors. (or) Write any two applications of concave mirrors.

Ans: Concave mirrors are commonly used in Torches, Searchlights, Vehicle Headlights, Shaving Mirrors, Dentist's Mirrors, Solar Furnaces. (Write any two uses)

14. List two important uses of convex mirrors. (or) Write any two applications of convex mirrors.

Ans: Convex mirrors are commonly used as rear-view mirrors in vehicles, Surveillance and security.

15. Write any two applications of mirrors.

Ans: Concave mirrors are commonly used in Torches, Searchlights, Vehicle Headlights, Shaving Mirrors, Dentist's Mirrors, Solar Furnaces. Convex mirrors are commonly used as rear-view mirrors in vehicles, Surveillance and security. (Write any two uses)

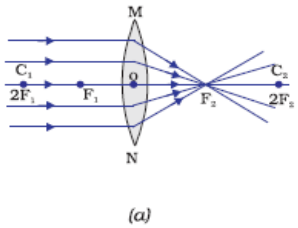
Section -1II	4 Marks Questions	Q.No: 12

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

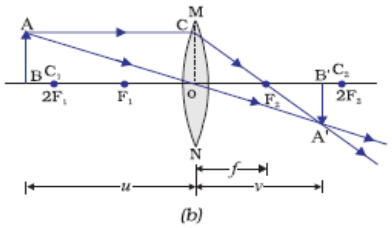
(a) At infinity **(b) Beyond $2F_1$** **(c) At $2F_1$**

(d) Between F_1 and $2F_1$ **(e) At F_1** **(f) Between F and Optical centre O**

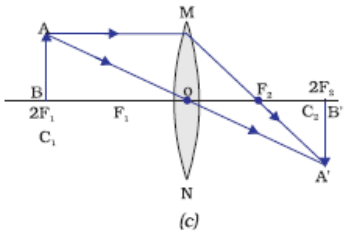
Ans:



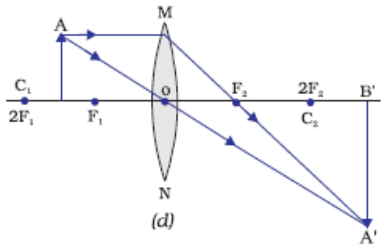
(a)



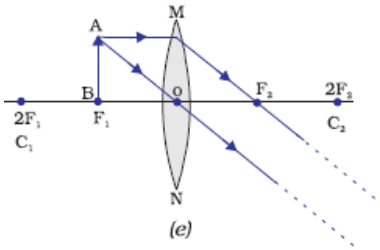
(b)



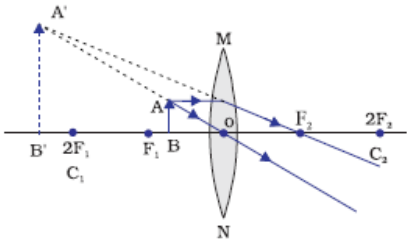
(c)



(d)



(e)



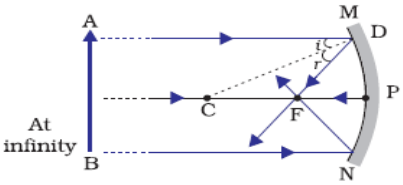
(f)

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

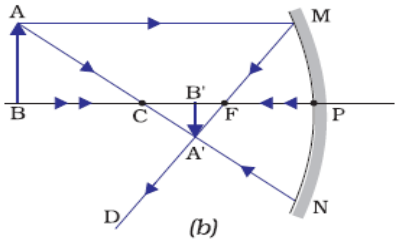
(a) At infinity **(b) Beyond C** **(c) At C**

(d) Between C and F **(e) At F** **(f) Between P and F**

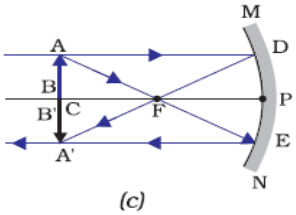
Ans:



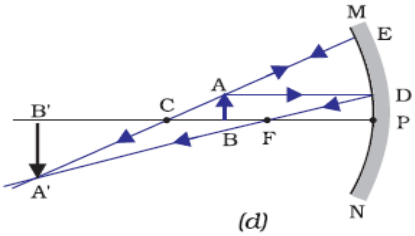
(a)



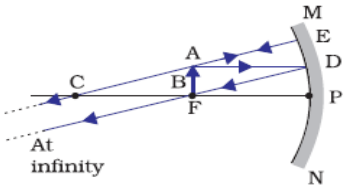
(b)



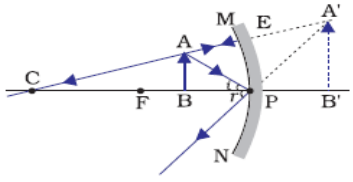
(c)



(d)



(e)



(f)

Section - III	4 Marks Questions	Q.No: 14

1.

Material medium	Air	Ice	Rubby	Benzene
Refractive Index	1.0003	1.31	1.71	1.50

Observe the table and answer the following questions.

i) Which material medium light travels faster?

ii) In which material medium the speed of light is least?

iii) What is the speed of light in air?

iv) Calculate the speed of light in Benzene? (Speed of light in vacuum is 3×10^8 ms^{-1})

Ans: i) Air
ii) Ruby
iii) 3×10^8 m/s
iv) Speed of light in Benzene (v) = C/n= $3 \times 10^8/1.5 = 2 \times 10^8$ m/s

2.

Material medium	Air	Ice	Rubby	Benzene
Refractive Index	1.0003	1.31	1.71	1.50

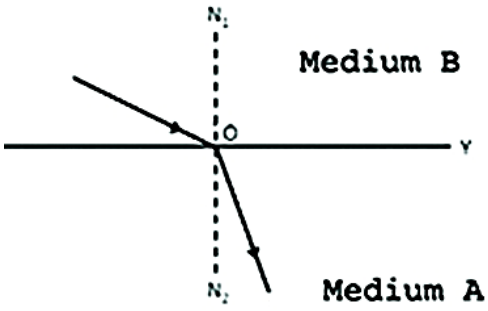
Observe the table and answer the following questions.

i) Which material medium is optically rarer?
ii) Which material medium is optically denser?
iii) Write the relation between refractive index and speed of light in the medium?
iv) What is the SI unit of Refractive Index?
v) Arrange the above material media in the ascending order with respect to the speed of light.

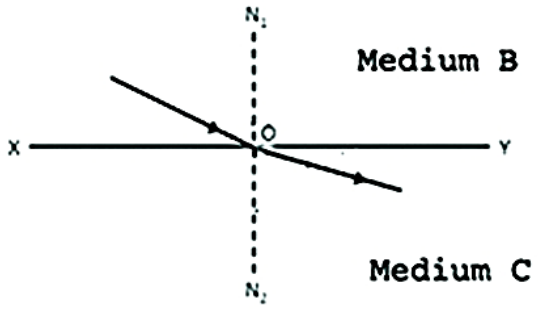
Ans: i) Air
ii) Ruby
iii) $n \alpha 1/v$ (or) Inversely proportional
iv) No unit
v) Air, Ice, Benzene, Ruby

3. Following diagrams show refraction of light in two cases. Answer the questions given below based on the diagrams given

Case-1



Case-2



i) Which medium is optically rarer among A, B and C?
ii) Which medium is optically denser among A, B and C?
iii) Arrange A,B and C in ascending order with respect to speed of light.
iv) Arrange A,B and C in ascending order of their refractive indices.

Ans: i) Medium C
ii) Medium A
iii) A < B < C
iv) C < B < A

4.

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

Observe the table and answer the following questions.

i) Which material medium light travels faster?
ii) Which material medium light travels lowest?
iii) In which material medium the refractive index is least?
iv) In which material medium the refractive index is greatest?
v) Calculate the refractive index of Benzene? (Speed of light in vacuum is 3×10^8 ms^{-1})

Ans: i) Air
ii) Diamond

iii) Air
iv) Diamond
v) Refractive index of Benzene (n) = C/V= 3 x 10^8/2 x 10^8 = 1.5

5.

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.

i) What happens to the speed of light when light is passing from Water to Rock salt?
ii) Whether the refracted ray bends towards normal or away from the normal when light ray travelled from Benzene to Air?
iii) The refractive index of Diamond is 2.42. What is the meaning of this statement?
iv) 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.

6.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

7. 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

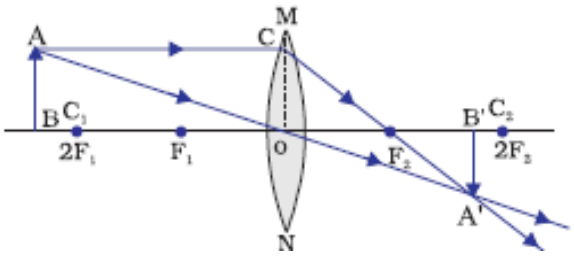
8. Fill the table following, which is related to concave mirror.

Position of the Object	Position of the Image	Size of the image	Nature of the image
At infinity		Highly diminished, point-sized	
	At C		Real and inverted
Between C and F			Real and inverted
At F		Highly enlarged	

Ans:

Position of the Object	Position of the Image	Size of the image	Nature of the image
At infinity	**At the focus F**	Highly diminished, point-sized	**Real and inverted**
At C	At C	**Same size**	Real and inverted
Between C and F	**Beyond C**	**Enlarged**	Real and inverted
At F	**Behind the mirror**	Highly enlarged	**Virtual and erect**

9.



Observe the ray diagram and answer the following questions.

i) Which lens used in this ray diagram?
ii) Where is the position of the object?
iii) Where the position of the image?
iv) What is the nature of the image?
v) If focal length of the lens is 10 cm, then what is the radius of curvature of this lens?
vi) Is magnification being less than 1 or greater than 1?
vii) If the height of the object is 10cm at $2F_1$, then what is the height of the image?

Ans: i) Convex lens
ii) Beyond $2F_1$
iii) Between F_2 and $2F_2$
iv) Real, Inverted and diminished
v) 20 cm
vi) Less than 1
vii) 10 cm

2. Acids, Bases and Salts

Structure: 2(4 Marks) + 2(1 Mark) or 1(8 Marks) + 1(2 Marks) = 10 Marks

Section -1	1 Mark Questions	Q.No: 1 - 8

1. Give example for an acid
Ans: Hydrochloric acid (or) HCl
2. Give example for a base
Ans: Sodium hydroxide (or) NaOH
3. Give example for salt
Ans: Sodium chloride (or) NaCl
4. Write the bleaching power formula.
Ans: $CaOCl_2$
5. What is the common name of the compound $CaOCl_2$?
Ans: Bleaching powder
6. Write the Plaster of Paris formula.
Ans: $CaSO_4.\frac{1}{2}H_2O$
7. Write the gypsum formula.
Ans: $CaSO_4.2H_2O$
8. Name the substance which on treat-men with chlorine yields bleaching powder.
Ans: Dry slaked lime (or) $Ca(OH)_2$
9. 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
10. Which gas evolves, when metal carbonate or metal hydrogen carbonate react with acids
Ans: Carbon dioxide or CO_2
11. Give any one example for neutralisation reaction?
Ans: $NaOH + HCl \rightarrow NaCl + H_2O$
12. What is the range of pH scale?
Ans: 0 – 14
13. What is pH value of a neutral solution?
Ans: 7
14. What types of medicines is used for treating indigestion?
Ans: Antacid
15. The pH value of a solution is 10. What is its colour in the presence of methyl orange indicator?
Ans: Yellow
16. What happens to the pink colour of phenolphthalein in a basic solution?
Ans: Pink colour in a basic solution.
17. Write an equation for the reaction between acid and base.
Ans: Acid + Base → Salt + Water
18. What happens when carbon dioxide is passed through lime water?
Ans: A white precipitate of calcium carbonate is formed.
19. What happens when acids react with metals?
Ans: Hydrogen gas is evolved**.**
20. Name the sodium compound which is used for softening hard water.
Ans: Washing soda (or) sodium carbonate.
21. What does a pH value less than 7 indicate?
Ans: An acidic solution.
22. Why are toothpastes generally basic?
Ans: Toothpaste neutralise the excess acid and prevent tooth decay.

23. What happens when Plaster of Paris is mixed with water?
Ans: It changes into a hard mass of gypsum.
24. How many molecules of water of crystallisation are there in Washing soda crystals.
Ans: 10

Section -1I	2 Mark Questions	Q.No: 9 - 11

1. What happens if curd or sour substances kept in brass or copper vessels?
Ans: Curd or sour substances contain acids. These acids react with metals like brass or copper to form salts, some of which may be poisonous. Consuming food from such vessels can lead to food poisoning and damage one's health.
2. A milkman adds a very amount of baking soda to fresh milk. Why does shift the pH of the fresh milk 6 to slightly alkaline?
Ans: pH value of fresh milk is 6 and pH value of baking soda is 8.1. When milkman adds a little baking soda to fresh milk to make it slightly alkaline. The pH value of fresh milk is slightly increase and the spoilage of milk can slow down.
3. A milkman adds a very amount of baking soda to fresh milk. Why does this milk take a long time to set as curd?
Ans: The pH of milk 6 it contains lactose and small quantity of lactic acid. When milk turns to curd the lactose present in milk turns lactic acid hence p^H of solution decreases.
4. Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.
Ans: The p^H of milk 6 it contains lactose and small quantity of lactic acid. When milk turns to curd the lactose present in milk turns lactic acid hence p^H of solution decreases.
5. 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.
6. 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.
7. What happens when water is added to quick lime?
Ans: When water is added to quick lime, slaked lime and heat are formed.
8. 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.
9. Why does distilled water not conduct electricity, whereas rain water does?
Ans: In Distilled water, the concentration of both H_3O^+ and OH^- is same. Distilled water is purest form of water. The extent of ionization is less for pure water. So, it is weak electrolyte hence it does not conduct of electricity.
10. 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.
11. Plaster of Paris should be stored in a moisture-proof container. Explain why?
Ans: Plaster of Paris is a white powder and on mixing with water or presence of moisture, it sets into hard solid mass due to the formation of gypsum. So, Plaster of Paris should be stored in moisture – proof container.
12. What happens if a solution of sodium hydrogen carbonate is heated?
Ans: When a solution of sodium hydrogen carbonate is heated, it decomposes to form sodium carbonate, water, and carbon dioxide gas.

Section -1II	4 Marks Questions	Q.No: 13

1. Give important uses of washing soda (or) Write the uses of washing soda.

Ans: i) It is used in glass, soap and paper industries.
ii) It is used in the manufacture of sodium compounds such as borax.
iii) It is used as a cleaning agent for domestic purposes.
iv) It is used for removing permanent hardness of water.

2. Give important uses of baking soda (or) Write the uses of baking soda.

Ans: i) It is used to prepare baking powder
ii) It is also an ingredient in antacids.
iii) It is also used as soda-acid in fire extinguishers
iv) It acts as mild antiseptic

3. Give important uses of Bleaching powder (or) Write the uses of Bleaching powder

Ans: i) for bleaching cotton and linen in the textile industry, for bleaching wood pulp in paper factories
ii) for bleaching washed clothes in laundry;
iii) as an oxidising agent in many chemical industries; and
iv) to make drinking water free from germs.

4. 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.

5. What are the applications of pH in daily life.

Ans:i. Plants and animals has sensitive pH values
i) When pH of rain water is less than 5.6, it is called acid rain.
ii)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.

ii. Tooth decay
i) Tooth decay starts when the pH of the mouth is lower than 5.5.
ii) Tooth enamel, made of calcium phosphate is the hardest substance in the body.
iii) But is corroded when the pH in the mouth is below 5.5.

iii. p^H in our digestive system
i) During indigestion the stomach produces too much acid and this causes pain and irritation.
ii) To get rid of this pain, people use bases called antacids.

iv. p^H of the soul
i) Plants require a specific pH range for their healthy growth.

Section -1II	4 Marks Questions	Q.No: 12

1. Draw the diagram which shows that acid solution in water conducts electricity.

Ans:

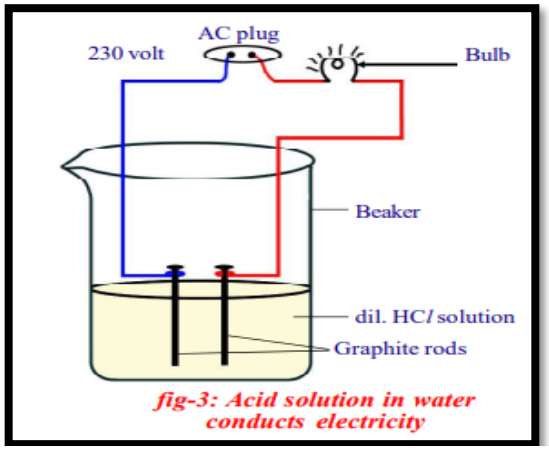


fig-3: Acid solution in water conducts electricity

2. Draw a diagram of arrangement of apparatus for the reaction of acids with metals (or) Draw the diagram that showing the ration of zinc granules with dil.HC*l* and testing hydrogen gas by a burning matchstick.

Ans:

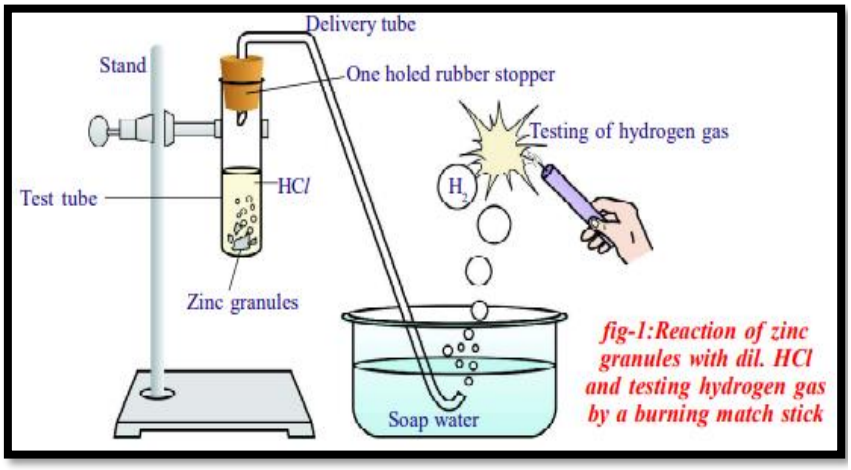


fig-1:Reaction of zinc granules with dil. HCl and testing hydrogen gas by a burning match stick

3. Draw a diagram of passing carbon dioxide gas through calcium hydroxide solution when metal carbonates or metal hydrogen carbonates react with acids.

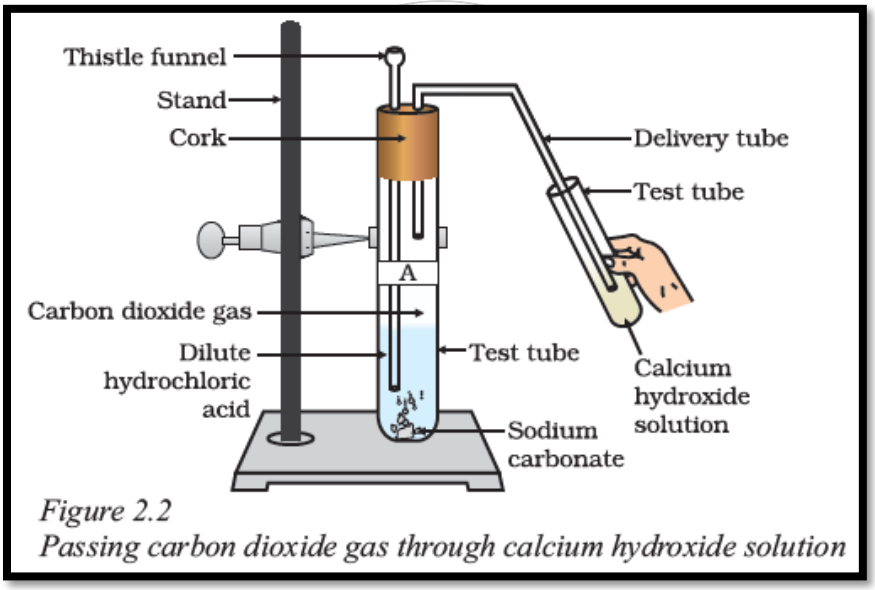


Figure 2.2
Passing carbon dioxide gas through calcium hydroxide solution

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

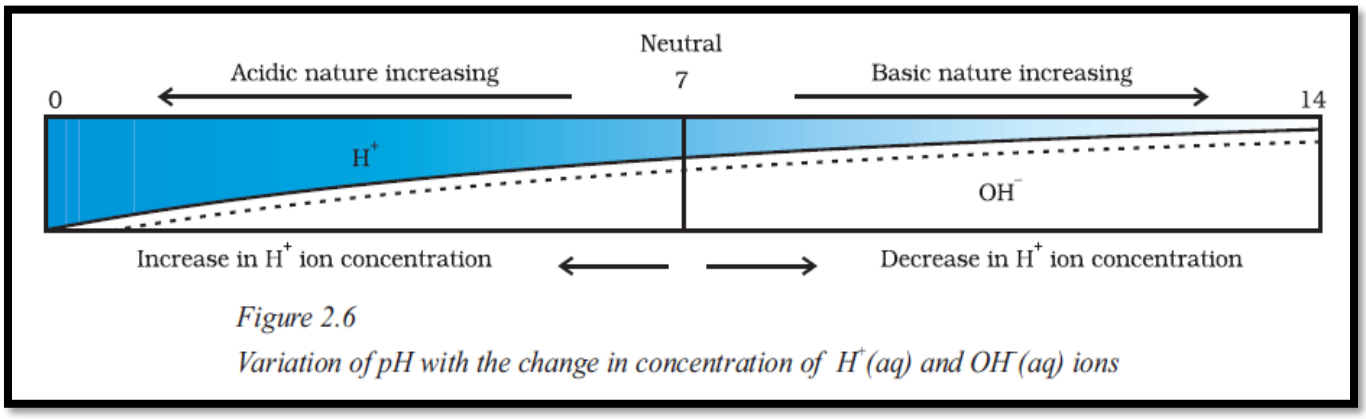


Figure 2.6
Variation of pH with the change in concentration of $H^+(aq)$ and $OH^-(aq)$ ions

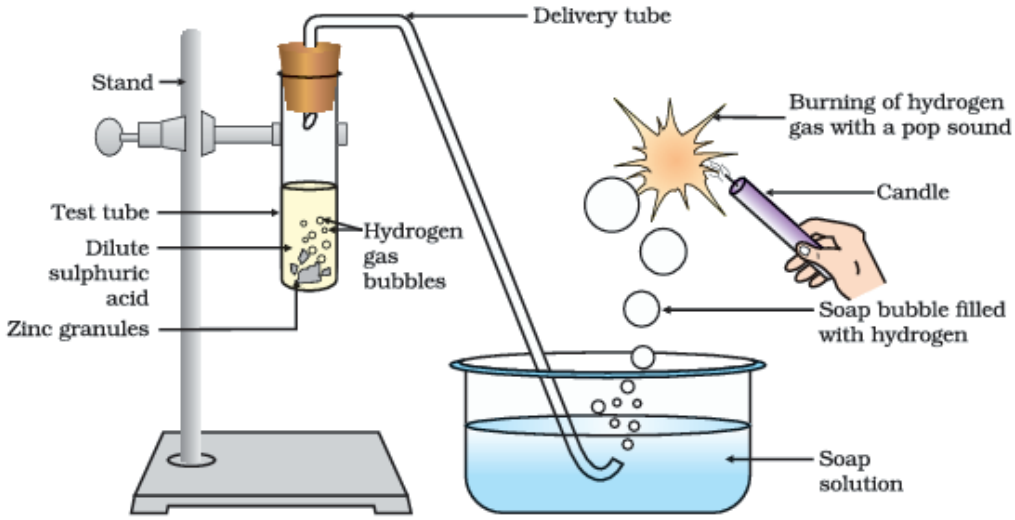
Section -1V	8 Marks Questions	Q.No: 17

1. Write an activity to show that the reaction of acids with metals.

Aim: To show that acid produce hydrogen gas reacted with metals.

Required Materials: Test tube, Delivery tube, Glass trough, Candle, Soap water, dilute H_2SO_4, Zinc granules.

Procedure:



i) Set the apparatus as shown in figure.
ii) Take about 5 mL of dilute sulphuric acid in a test tube and add a few pieces of zinc granules to it.
iii) We observe a gas is evolved from the zinc granules
iv) Pass the gas being evolved through the soap solution.
v) We observe some bubbles formed in the soap solution.
vi) Take a burning candle near the gas filled bubble.
vii) The candle turns off with a pop sound.
viii) The pop sound indicates that the gas evolved in H_2
ix) Repeat this experiment with remaining acids.

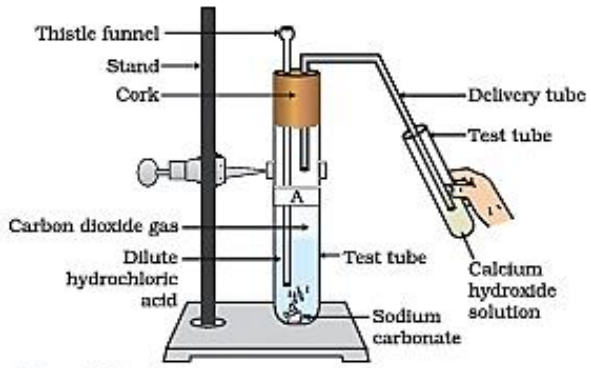
Conclusion/Observation: We conclude that hydrogen gas is produced when acid reacts with metals.

2. Write an activity to show that metal carbonates and metal hydrogen carbonates react with acids. (or) Show that the reaction of Carbonates and Hydrogen carbonates with acids produces carbon dioxide gas

Aim: CO_2 gas evolved when Metal carbonates and metal hydrogen carbonates react with Acids.

Required Materials: Stand, Test tubes, sodium carbonate, sodium hydrogen carbonate, dilute HCl, Delivery tube, Thistle funnel, Lime water.

Procedure:



i) Take two test tubes, label them as A and B.
ii) Take about 0.5 g of sodium carbonate (Na_2CO_3) in test tube A and about 0.5 g of sodium hydrogen carbonate ($NaHCO_3$) in test tube B.

iii) Add about 2 mL of dilute HCl to both the test tubes.
iv) CO_2 gas evolved in both test tubes A and B.
v) Pass the gas produced in each case through lime water (calcium hydroxide solution) as shown in Figure.
vi) We observe that a milky precipitate of calcium carbonate formed.

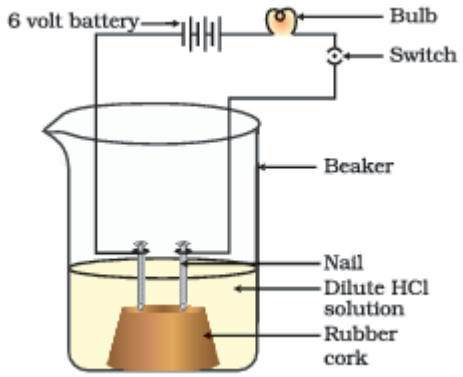
Observation: CO_2 gas evolved when Metal carbonates and metal hydrogen carbonates react with acids.

3. Compounds such as alcohols and glucose also contain hydrogen but are not categorised as acids. Describe an Activity to prove it. (or) Write an activity to show that acid solution in water conducts electricity.

Aim: To show that acid solution in water conducts electricity.

Required Materials: Solutions of glucose, alcohol, hydrochloric acid, sulphuric acid, Beaker, Bulb, 6V battery, Nails, Rubber cork

Procedure:



i) Take solutions of glucose, alcohol, hydrochloric acid, sulphuric acid.
ii) Fix two nails on a cork, and place the cork in a 100 mL beaker.
iii) Connect the nails to the two terminals of a 6 volt battery through a bulb and a switch, as shown in Figure.
iv) Now pour some dilute HCl in the beaker and switch on the current.
v) Repeat with dilute sulphuric acid.
vi) The bulb will start glowing in the case of acids,
vii) Repeat the experiment separately with glucose and alcohol solutions.
viii) Glucose and alcohol solutions do not conduct electricity.

Observation: Glowing of the bulb indicates that there is a flow of electric current through the solution. The electric current is carried through the acidic solution by H^+ ions.

4. Describe an activity to show the water of crystallisation.

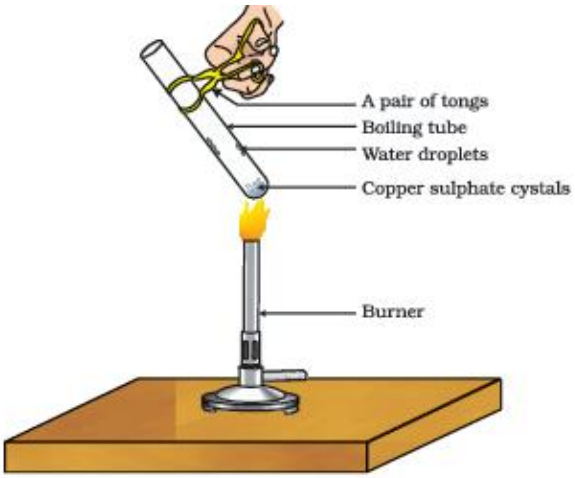
Aim: To show the water of crystallisation.

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

Procedure:

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



10. The Human Eye and The Colourful World

Structure: 1(8 Marks) + 1(1 Mark) = 9 Marks

Section -1	1 Mark Questions	Q.No: 1 - 8

1.The change in focal length of eye lens is caused by the action of the _____
Ans: Ciliary muscles
2. The least distance of distinct vision for a young adult with normal vision is about _____
Ans: 25 cm
3. The change in the curvature of the eye lens can thus change its _____
Ans: focal length
4. The minimum distance, at which objects can be seen most distinctly without strain is called _____
Ans: near point or least distance of distinct vision.
5. The human eye forms the image of an object at its _____
Ans: retina
6. The human eye can focus on objects at different distances by adjusting the focal length of the eye lens. This is due to _____
Ans: accommodation of lens
7. The ability of eye lens to adjust its focal length is called _____
Ans: accommodation of lens
8. The process of adjusting focal length is called _____
Ans: accommodation of lens
9. The condition of the crystalline lens of old age people becomes milky and cloudy is called _____
Ans: cataract.
10. Myopia is also known as _____
Ans: near sightedness.
11. What is the other name of near sightedness?
Ans: Myopia
12. How is Myopia or near sightedness corrected?
Ans: By using Concave lens
13. Hypermetropia is also known as_____
Ans: far sightedness
14. What is the other name of long sightedness?
Ans: Hypermetropia
15. How is Hypermetropia or long sightedness corrected?
Ans: By using Convex lens
16. The defect of find it difficult to see nearby objects comfortably and distinctly without corrective eye-glasses are called _____
Ans: Presbyopia.
17. Ammalu cannot read the newspaper clearly. What type of eye defect she?
Ans: Hypermetropia
18. What type of image formed by the eye lens?
Ans: Real and inverted image
19. The splitting of white light into its component colours is called _____
Ans: dispersion
20. A rainbow is formed due to _____
Ans: dispersion
21. Twinkling of stars due to _____
Ans: Atmospheric refraction
22. The blue colour of sky due to _____
Ans: Scattering of light

23. The phenomenon of scattering of light by the colloidal particles gives rise to _____

Ans: Tyndall effect

Section -1V	8 Marks Questions	Q.No: 15

1. Explain, how do you correct the eye defect Myopia with a suitable diagram.

(or)

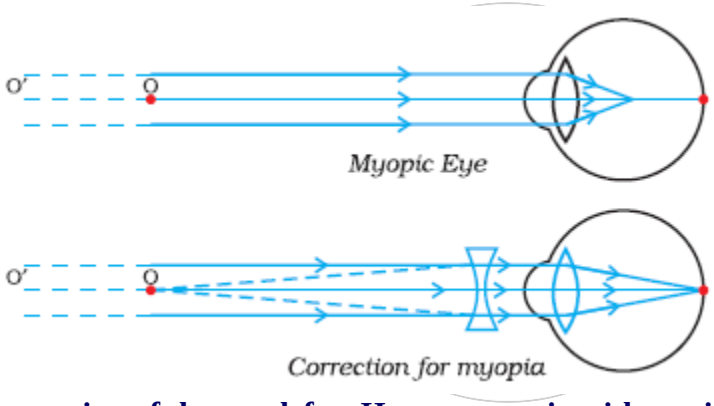
What is Myopia? How do you correct the eye defect Myopia?

(or)

Teja is not able to see the letters clearly far from her. Identify the eye defect she has been suffering from and how can you rectify it? Explain.

Ans: Myopia:

i) Myopia is also known as nearsightedness.
ii) A person with myopia can see nearby objects clearly but cannot see distant objects distinctly.
iii) A person with this defect has the far point nearer than infinity. Such a person may see clearly upto a distance of a few metres.
iv) In a myopic eye, the image of a distant object is formed in front of the retina and not at the retina itself.
v) This defect may arise due to i) excessive curvature of the eye lens or ii) elongation of the eyeball.
vi) This defect can be corrected by using a concave lens of suitable power.
vii) A concave lens of suitable power will bring the image back on to the retina and thus the defect is corrected.



2. Explain the correction of the eye defect Hypermetropia with a suitable diagram.

(or)

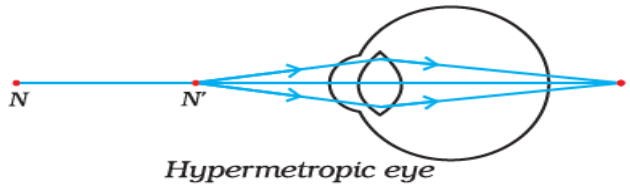
What is Hypermetropia? How do you correct the eye defect Hypermetropia?

(or)

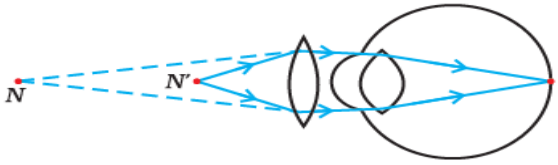
Teja is not able to see the letters clearly near from her. Identify the eye defect she has been suffering from and how can you rectify it? Explain.

Ans: Hypermetropia:

i) Hypermetropia is also known as farsightedness.
ii) A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly.
iii) The near point, for the person, is farther away from the normal near point (25 cm). Such a person has to keep a reading material much beyond 25 cm from the eye for comfortable reading.
iv) This is because the light rays from a closeby object are focussed at a point behind the retina.
v) This defect arises either because i) the focal length of the eye lens is too long or ii) the eyeball has become too small.
vi) This defect can be corrected by using a convex lens of suitable power.
vii) A convex lens of suitable power will bring the image back on to the retina and thus the defect is corrected.



Hypermetropic eye



Correction for Hypermetropic eye

3. Explain the following.

i) Twinkling of stars **ii) Formation of Rainbow**

Ans: i) Twinkling of stars

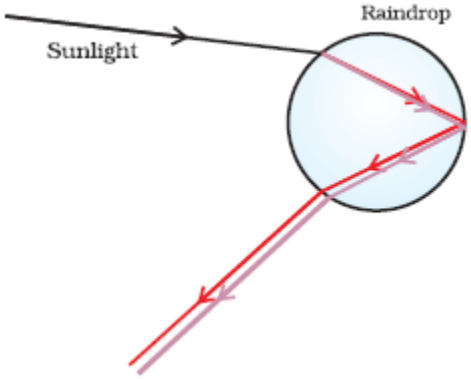
The twinkling of a star is due to atmospheric refraction of starlight. The starlight, on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth. The atmospheric refraction occurs in a medium of gradually changing refractive index.

Since the atmosphere bends starlight towards the normal, the apparent position of the star is slightly different from its actual position. The star appears slightly higher (above) than its actual position when viewed near the horizon.

The star sometimes appears brighter, and at some other time, fainter, which is the twinkling effect.

ii) Formation of Rainbow

A rainbow is a natural spectrum appearing in the sky after a rain shower. It is caused by dispersion of sunlight by tiny water droplets, present in the atmosphere. A rainbow is always formed in a direction opposite to that of the Sun. The water droplets act like small prisms. They refract and disperse the incident sunlight, then reflect it internally, and finally refract it again when it comes out of the raindrop. Due to the dispersion of light and internal reflection, different colours reach the observer's eye.



4. Explain the following.

a) Scattering of light **b) Tyndall effect**

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) Tyndall effect

i) The earth's atmosphere is a heterogeneous mixture of minute particles. These particles include smoke, tiny water droplets, suspended particles of dust and molecules of air.

ii) When a beam of light strikes such fine particles, the path of the beam becomes visible.
iii) The light reaches us, after being reflected diffusely by these particles.
iv) The phenomenon of scattering of light by the colloidal particles is Tyndall effect.

5. Explain the following

a) Myopia b) Hypermetropia c) Presbyopia d) Power of accommodation of eye lens

Ans: a) Myopia

i) Myopia is also known as nearsightedness.
ii) A person with myopia can see nearby objects clearly but cannot see distant objects distinctly.
iii) A person with this defect has the far point nearer than infinity. Such a person may see clearly upto a distance of a few metres.
iv) This defect can be corrected by using a concave lens of suitable power.

b) Hypermetropia

i) Hypermetropia is also known as farsightedness.
ii) A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly.
iii) The near point, for the person, is farther away from the normal near point (25 cm). Such a person has to keep a reading material much beyond 25 cm from the eye for comfortable reading.
iv) This defect can be corrected by using a convex lens of suitable power.

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 dioptres.

6. 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.

M.SRINIVASA RAO

3. Metals and Non-metals

Structure: 1(8 Marks) + 1(1 Mark) or 2(4 Marks) + 1(1 Mark) = 9 Marks

Section -1	1 Mark Questions	Q.No: 1 - 8

1. Propose a method to extract a highly reactive metal from its ore?
Ans: Electrolysis.
2. Why oxides of high reactive metals cannot be reduced by carbon.
Ans: These metals have more affinity for oxygen than carbon.
3. What happens to silver articles when exposed to moist air?
Ans: They acquire a blackish tinge due to the formation of silver sulphide.
4. What happens to the insoluble impurities during the electrolytic refining of any metal?
Ans: They get settle down at the bottom of the anode
5. Why pure gold is not used for making jewellery?
Ans: It is very soft
6. What happens to potassium and sodium if they are kept in open (or)
Why potassium and sodium are immersed in kerosene?
Ans: They react so vigorously and catch fire if kept in the open. So, immersed in kerosene
7. Why do ionic compounds have high melting points?
Ans: A considerable amount of energy is required to break the strong inter-ionic attraction.
8. What happens when magnesium is heated to its ignition temperature?
Ans: It burns with blinding white light to form magnesium oxide.
9. Write electronic configuration of an element having atomic number 11.
Ans: 2, 8, 1.
10. What happens to the blue colour of copper sulphate solution when an iron nail is dipped in it?
Ans: The blue colour of the copper sulphate solution fades.
11.Which one of the following is a non-metal?
A) Magnesium B) Gold C) Sulphur D) Silver
Ans: C) Sulphur
12. Which of the following pairs will give displacement reactions?
A) NaCl solution and copper metal B) $MgCl_2$ solution and aluminium metal
C) $FeSO_4$ solution and silver metal D) $AgNO_3$ solution and copper metal.
Ans: D) $AgNO_3$ solution and copper metal.
13. Which of the following methods is suitable for preventing an iron frying pan from rusting?
A) Applying grease B) Applying paint C) Applying a coating of zinc D) All of the above.
Ans: D) All of the above.
14. An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be
A) calcium B) carbon C) silicon D) iron.
Ans: A) calcium
15. Food cans are coated with tin and not with zinc because
A) zinc is costlier than tin. B) zinc has a higher melting point than tin.
C) zinc is more reactive than tin. D) zinc is less reactive than tin.
Ans: C) zinc is more reactive than tin.
16. Give an example of a metal which is a liquid at room temperature.
Ans: Mercury
17. Give an example of a metal which can be easily cut with a knife.
Ans: Sodium
18. Give an example of a metal which is the best conductor of heat.
Ans: Silver and copper
19. Give an example of a metal which is a poor conductor of heat.

Ans: Lead and mercury.

20. Write any one physical property of metals.

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

21. 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.

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

Ans: Painting oiling or greasing

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

Ans: Acidic oxides

24. Which metals do not corrode easily?

Ans: Gold, Platinum

25. Write any one general properties of ionic compounds?

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

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

Ans: Gold, Platinum

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

Ans: Reduction

28. Give one example of amphoteric oxides?

Ans: Aluminium oxide and zinc oxide

29. Name a non-metal which is lustrous.

Ans: Iodine

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

Ans: Gold and silver

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

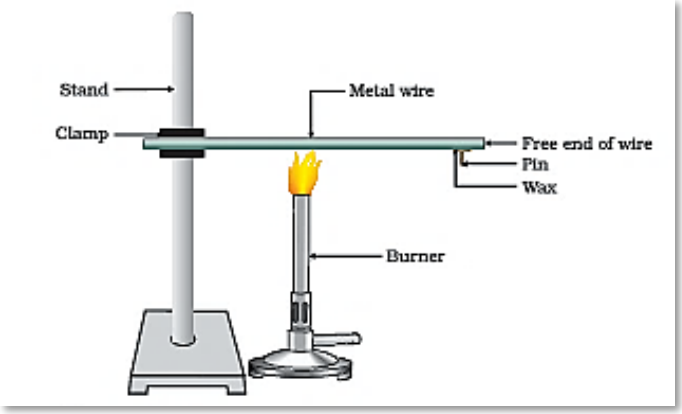
Ans: Potassium (K)

32. Name the least reactive metal shown in the activity series table.

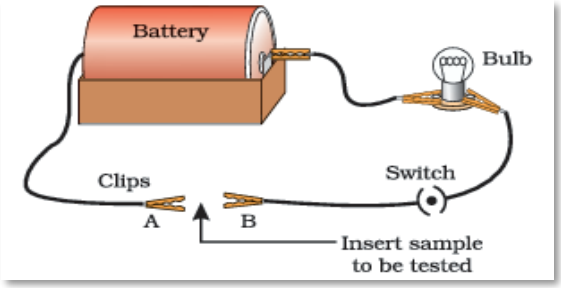
Ans: Gold (Au).

Section -1II	4 Marks Questions	Q.No: 12

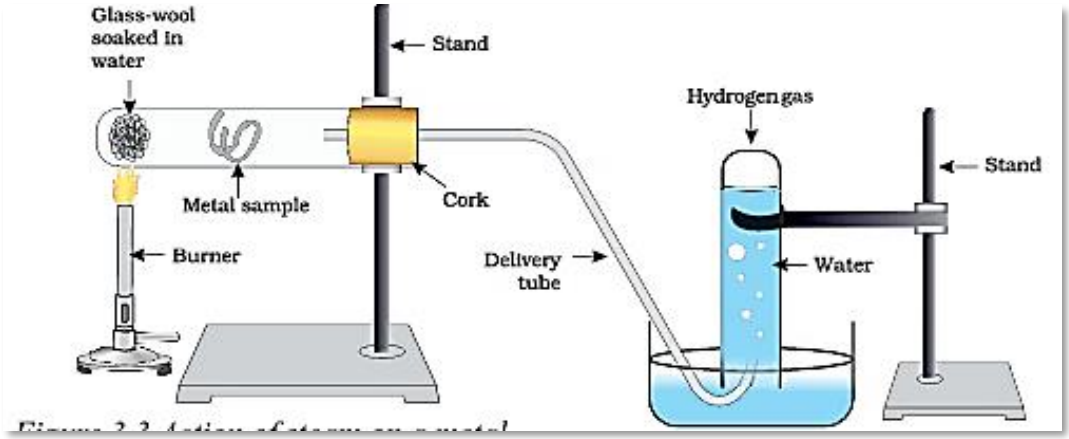
1.Draw a neat diagram to show the metals are good conductors of heat



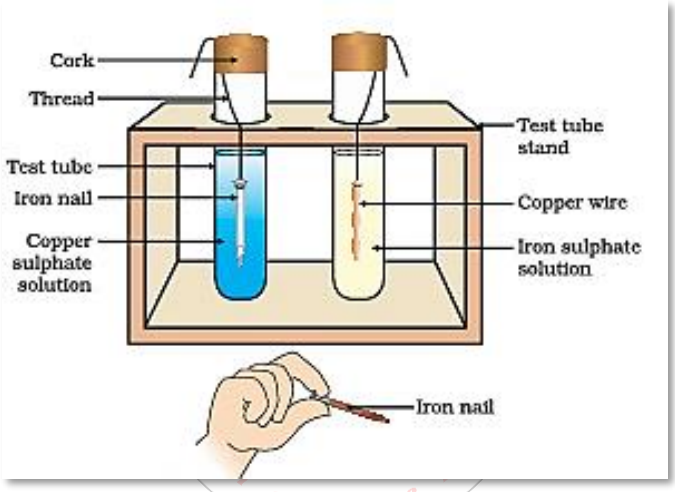
2. Draw a neat diagram to show the metals are good conductors of electricity.



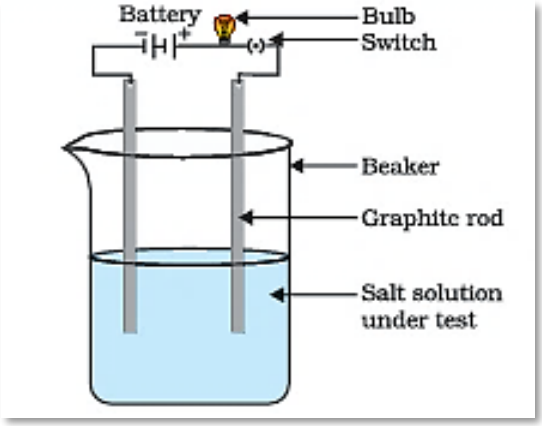
3. Draw a neat diagram to show the action of steam on a metal (or) draw a neat diagram to show the metal reacts with water.



4. 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.



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



Section -1II	4 Marks Questions	Q.No: 13

1. Write any four uses of metals.

Ans: i) Jewellery and ornaments are made of metals
ii) Conduction materials are made of metals
iii) Utensils made of metals.
iv) Electrical wiring made of metals.

2. Write any four uses of Non-metals.

Ans: i) Chlorine is used in bleaching powder.
ii) Diamond is used in cutting of glass
iii) Carbon is used in lubricants.
iv) Nitrogen used in manufacturing of ammonia.
v) Iodine is used as tincture iodine.
vi) Oxygen is used in breathing cylinders. **(Write any four uses)**

3. Write any two advantages of avoiding corrosion and thermite process.

Ans: Advantages of avoiding corrosion:
i) Extended lifespan of equipment.
ii) Reduced maintenance costs.
iii) Enhanced safety.
iv) Improved operational efficiency.

Advantages of thermite process:
i) To join cracked machine parts.
ii) To join railings of railway track.

4. Write any four uses of extraction of metals from its ores.

Ans: i) Manufacturing of tools and machinery.
ii) Construction and infrastructure development.
iii) Electrical appliances.
iv) Production of consumer goods.

5. 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.

Section -1V	8 Marks Questions	Q.No: 17

1. Explain the experimental procedure to investigate the conditions under which iron rusts.

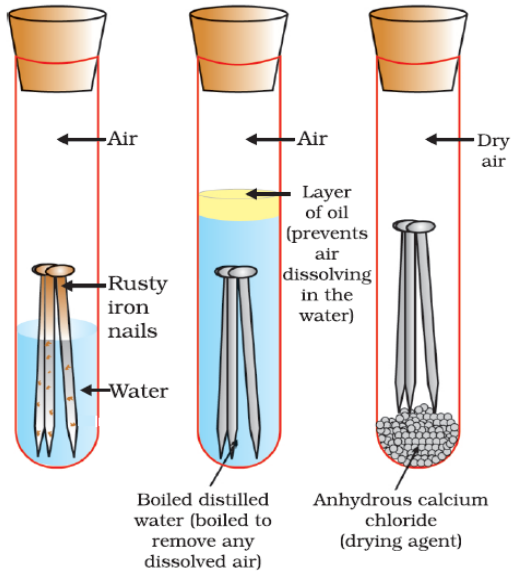
(or)

Suggest an activity to prove that the presence of air and water are essential for corrosion. Explain the procedure

Ans:

Aim: Investigate the conditions under which iron rusts.

Required Materials: Test tubes, Iron nails, Water, Boiled distilled water, Anhydrous calcium chloride.



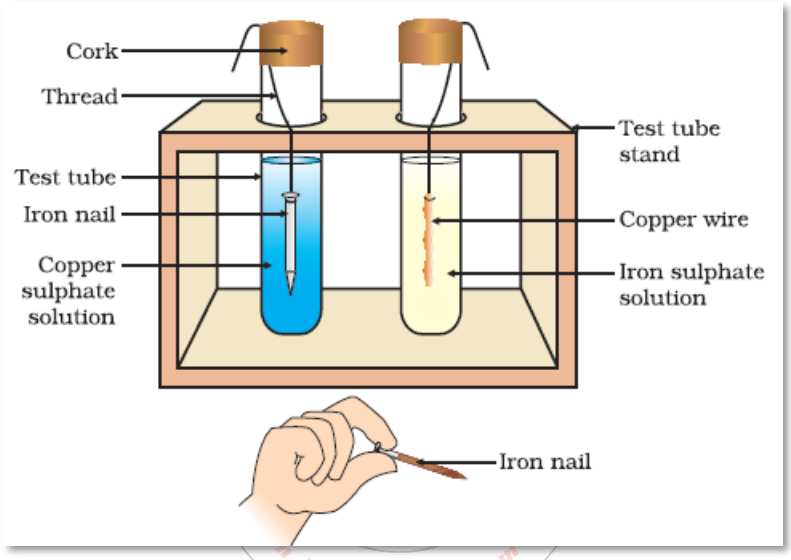
Procedure: i) Take three test tubes and place clean iron nails in each of them.
ii) Label these test tubes A, B and C. Pour some water in test tube A and cork it.
iii) Pour boiled distilled water in test tube B, add about 1 mL of oil and cork it. The oil will float on water and prevent the air from dissolving in the water.
iv) Put some anhydrous calcium chloride in test tube C and cork it. Anhydrous calcium chloride will absorb the moisture, if any, from the air. Leave these test tubes for a few days and then observe figure.

Observation: i) We observe that iron nails rust in test tube A, but they do not rust in test tubes B and C.
ii) In the test tube A, the nails are exposed to both air and water. In the test tube B, the nails are exposed to only water, and the nails in test tube C are exposed to dry air.

2. How do metals react with solutions of other metal salts? Describe an activity. (or)
Write an activity to show that high reactive metals displaces low reactive metals from their compounds.

Ans:

Aim: Observe the reactive metals can displace less reactive metals from their compounds in solution.
Required Materials: Copper wire, Iron nail, Iron sulphate solution, Copper sulphate solution, Test tubes



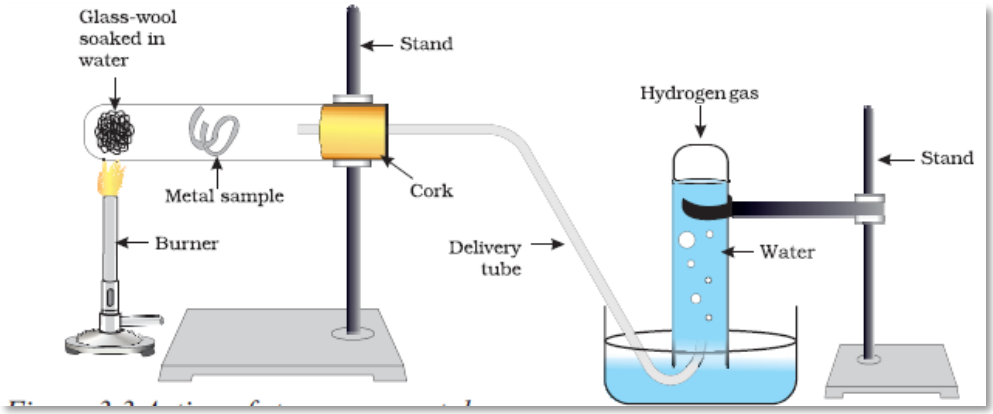
Procedure: i) Take a clean wire of copper and an iron nail.
ii) Put the copper wire in a solution of iron sulphate and the iron nail in a solution of copper sulphate taken in test tubes figure.
iii) Record your observations after 20 minutes.
iv) The reaction occurs in the test in which iron nail is placed in a solution of copper sulphate.
v) The blue colour of copper sulpahte solution starts fading.
vi) This is a displacement reaction.

Observation: i) Reactive metals can displace less reactive metals from their compounds in solution.
ii) Iron metal displaces copper metal from its solution, iron is more reactive than copper

3. 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. How to show that metals are good conductors of heat with help an activity.

Ans:

Aim: To show that metals are good conductors of heat.

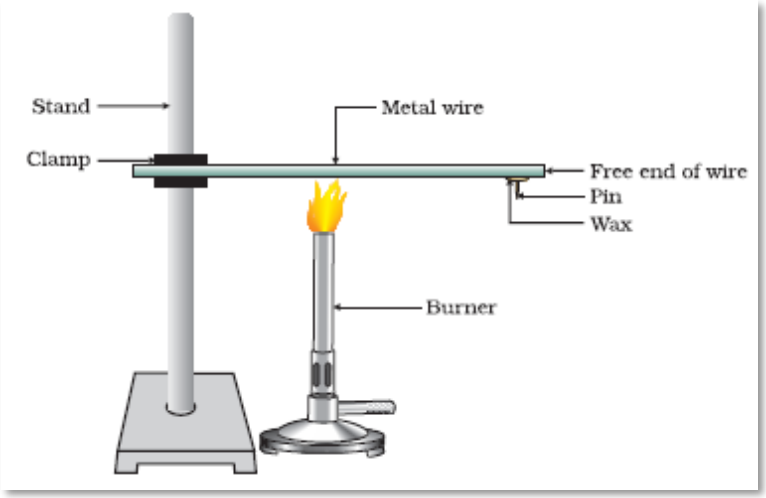
Required Materials: Copper/Aluminium wire, Stand, Clamp, Burner

Procedure: i) Take an aluminium or copper wire.

ii) Clamp this wire on a stand, as shown in Fig.

iii) Fix a pin to the free end of the wire using wax.

iv) Heat the wire with a spirit lamp, candle or a burner near the place where it is clamped.



Observations: i) When aluminium or copper wire is heated at one end, heat reaches the other end, melting the wax, and the pin gets detached.

ii) Metals are good conductors of heat.

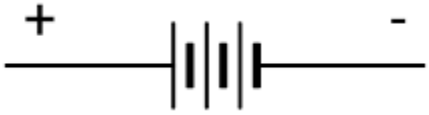
11. Electricity

Structure: 1(8 Marks) + 1(2 Marks) + 1(1 Mark) or 1(8 Marks) + 3(1 Mark) = 11 Marks

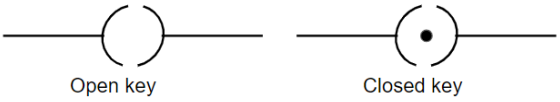
Section -1	1 Mark Questions	Q.No: 1 - 8

1. Draw the symbol of an electric cell.
Ans:

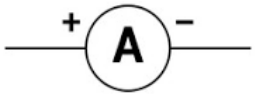
2. Draw the symbol of a battery or combination of cells
Ans:



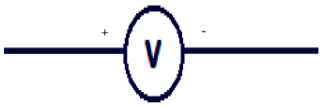
3. Draw the symbol of Plug key or switch
Ans:



4. Draw the symbol of an ammeter.
Ans:



5. Draw the symbol of a voltmeter.
Ans:

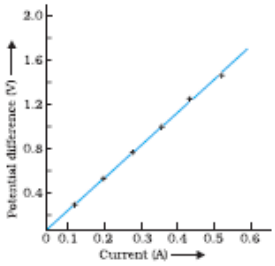


6. Draw the symbol of the electric bulb.
Ans:

7. Draw the symbol of a resistor of resistance.
Ans:

8. Draw the symbol of rheostat or variable resistance.
Ans:

9. Draw the V (Potential difference) – I (Current) graph for Ohm's law.
Ans:



10. 2 Ω, 4 Ω resistors are connected in series. What will be the resultant resistance?
Ans: $R=R_1+R_2 = 2 + 4 = 6\ \Omega$

11. Two resistors 3 Ω, 6 Ω are connected in parallel. What will be the resultant resistance?
Ans: $R = \frac{R1\ x\ R2}{R1+R2} = \frac{3x6}{3+6} = \frac{18}{9} = 2\Omega$

12. 1 KWH how many joules? (or) How many joules are there in one kilowatt hour?
Ans: $3.6x10^6 J$

13. How is an ammeter connected in a circuit? (or)
How is an ammeter connected in a circuit to measure current flowing through it?
Ans: Series in a circuit

14. How is voltmeter connected in a circuit?
Ans: Parallel in a circuit

15. On what factors does the resistance of a conductor depend?
Ans: Length, Area of cross-section, nature of the material.

16. Name a device that helps to maintain a potential difference across a conductor. (or)
How can we measure the potential difference across the ends of a conductor?
Ans: Voltmeter

17. What determines the rate at which energy is delivered by a current?
Ans: Electric power
18. Calculate the number of electrons constituting one coulomb of charge. (or)
How many electrons are contained in one coulomb of charge?
Ans: 6.25 x 10^{18} electrons.
19. Name a device that helps to maintain a potential difference across a conductor.
Ans: Voltmeter
20. Which metal is used almost exclusively for filaments of electric bulbs?
Ans: Tungsten
21. 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.
22. What is the lowest total resistance possible with four coils of 4Ω, 8Ω, 12Ω, 24Ω?
Ans: The lowest resistance is secured by connecting them in **parallel**.
23. What is the highest total resistance possible with four coils of 4Ω, 8Ω, 12Ω, 24Ω?
Ans: The highest resistance is secured by connecting them in **series.**
24. What will be the resistance of a new wire if the original wire of 4Ω is made twice as thick?
Ans: The resistance of the new wire will be 1Ω.
25. 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**.**
26. Write the formula for electric current in terms of charge and time.
Ans: I = $\frac{Q}{t}$
27. Express mathematically the potential difference.
Ans: V= $\frac{W}{q}$
28. Write the mathematical expression for Ohm's law?
Ans: V = IR
29. State the expression for the equivalent resistance of resistors in series.
Ans: R = R_1 + R_2 + R_3
30. 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 = $\frac{R1xR2xR3}{R1+R2+R3}$
31. Write a formula for electric power in terms of voltage and current.
Ans: P = VI
32. Which material is the best conductor of electricity?
Ans: Silver is the best conductor of electricity.
33. 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,
34. When do we say that the resistors are connected in series?
Ans: The current through each resistor is same
35. When do we say that the resistors are connected in parallel?
Ans: The potential difference across each resistor is same.
36. If two resistors of 6 Ω and 12 Ω were given to you, then how do you connect them to get 4 Ω as resultant resistance.
Ans: Parallel connection.
37.How can three resistors of resistances 2 Ω, 3 Ω and 6 Ω be connected to give a total resistance of 11 Ω?
Ans: Series connection.
38. How can three resistors of resistances 2 Ω, 3 Ω, and 6 Ω be connected to give a total resistance of 1 Ω?
Ans: Parallel connection.
39. Which is having more resistance a 220 V, 100 W bulb or a 220 V, 60 W bulb?
Ans: 60 W bulb.
40. What is the SI unit of resistance of a conductor connected in an electric circuit?

Ans: **ohm (or) Ω**

41. What is the SI unit of electric charge?

Ans: coulomb (or) C

42. What is the SI unit of electric circuit?

Ans: ampere (or) A

43. What is the SI unit of potential difference?

Ans: volt (or) V

44. What is the SI unit of electric power?

Ans: Watt (or) W

45. What is commercial unit of electrical energy?

Ans: Kilo Watt Hour (or) KWH

46. What is the SI unit of resistivity?

Ans: ohm-metre (or) Ω m

Section -1I	2 Marks Questions	Q.No: 9 - 11

1. Predict and write why the series arrangement is not used for domestic circuits? (or) Why is the series arrangement not used for domestic circuits?

Ans: In case of series arrangement, if one component fails the circuit is broken and none of the components works. So,the series arrangement is not used for domestic circuits.

2. Why is the tungsten used almost exclusively for filament of electric lamps?

Ans: Tungsten has a high resistivity and high melting point. So, it used as filament in electric lamps.

3. How does the resistance of a wire vary with its area of cross-section?

Ans: Electrons move more freely through a thick wire than through a thin wire. The resistance of conductor is directly proportional to its length and inversely proportional to the area of cross-section.

4. Why are copper and aluminium wires usually employed for electricity transmission?

Ans: Copper and Aluminium wires possess low resistivity and as such are generally used for electricity transmission.

5. Why should we connect electric appliances in parallel in a household circuit? What happens if they are connected in series?

Ans: If we connect electric appliances in parallel in a household circuit, then one of component fails the circuit does not break and remaining components are works.

In case of series arrangement, if one component fails the circuit is broken and none of the components works.

6. Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?

Ans: Resistivity of alloys is generally higher than that of its constituent metals and do not oxidized easily. So, coils of electric toasters and electric irons made of an alloy.

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

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

8. 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.

9. 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.

10. Why are alloys commonly used in electrical heating devices?

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

11. Why does the cord of an electric heater not glow while the heating element does?

Ans: The heating element of the electric heater is made of nichrome and it is very high resistance. So more electrical energy is converted into heat energy, hence heating element glows. But the cord, which is made up of copper has very low resistance. Thus, negligible heat is produced, so it does not glow.

12. 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.

13. 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.

Section -1V	8 Marks Questions	Q.No: 15

1. Deduce the expression for the equivalent resistance of three resistors connected in parallel in an electric circuit.

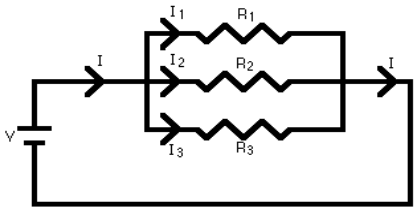
Ans: In parallel connection of resistors there is same potential difference at the ends of the resistors. .Hence, the potential difference is equal to V.

On applying Ohm's law to each resistor

$I_1 = V/R_1$

$I_2 = V/R_2$

$I_3 = V/R_3$



Let R be the equivalent resistance of the combination of resistors in series.

Also $I = V/R_p$

$I = I_1 + I_2 + I_3$

$V/R_p = V(1/R_1 + 1/R_2 + 1/R_3)$

$1/R_p = 1/R_1 + 1/R_2 + 1/R_3$

The reciprocal of the equivalent resistance of a parallel combination is equal to the sum of the reciprocals of the individual resistances.

2. Deduce the expression for the equivalent resistance of three resistors connected in series in an electric circuit.

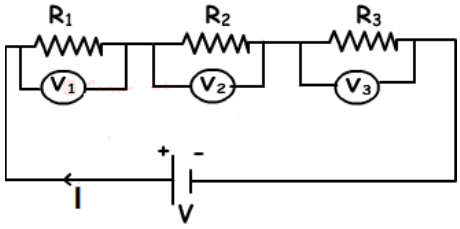
Ans: In series connection of resistors there is only one path for the flow of current in the circuit. .Hence, the current in the circuit is equal to I

On applying Ohm's law to each resistor

$V_1 = IR_1$

$V_2 = IR_2$;

$V_3 = IR_3$



Let R be the equivalent resistance of the combination of resistors in series.

Also $V = IR_s$

$V = V_1 + V_2 + V_3$

$IR_s = IR_1 + IR_2 + IR_3$

$IR_s = I(R_1 + R_2 + R_3)$

$R_s = R_1 + R_2 + R_3$

The resistance of the equivalent resistance in series combination is equal to the sum of their individual resistance.

3. Explain the following

i) Electric current ii) Potential difference iii) Ohm's law iv) Electric power

Ans: i) Electric current

The net charge flows across any cross-section of a conductor in unit time is called electric current.

$$I = \frac{Q}{t}$$

SI unit of electric current is ampere

ii) Potential difference

The amount of work done in moving a unit positive charge from one point to another point in the field.

$$V = \frac{W}{Q}$$

SI unit of potential difference is 'volt'.

iii) Ohm's law

The potential difference across the ends of a resistor is directly proportional to the current through it, provided its temperature remains the same.

V = IR

SI unit of resistance is 'ohm'.

iv) Electric power

The rate of doing electric work is called electric power.

P = VI

SI unit of electric power is 'watt'.

4. 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=ρ*l*/A	4. ρ= RA/*l*
5. Its depends on nature of the material, length, area of cross section and temperature	5. Its depends on nature of the material and temperature

5. Derive $H = I^2Rt$

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 ---------- (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

$H = I^2Rt$

MIDDE SRINIVASA RAO srini science mind

4. Carbon and its Compounds

Structure: 1(8 Marks) + 1(2 Marks) + 1(1 Mark) = 11 Marks

Section -1	1 Mark Questions	Q.No: 1 - 8

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

8. 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

9. Butanone is a four-carbon compound with the functional group
A) carboxylic acid B) aldehyde C) ketone D) alcohol.
Ans: C) ketone

10. 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

11.The by-product of soap is
A) Isoprene B) Glycerol C) Butene D) Ethylene glycol
Ans: B) Glycerol

12. 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

13. How many carbon atoms are present in one molecule of ethanol?
A) One B) Two C) Three D) Four
Ans: B. Two

14. 100% pure ethanol is called
A) Rectified spirit B) Absolute alcohol C) Denatured alcohol D) Power alcohol
Ans: B) Absolute alcohol

15. What does carbon burn in oxygen to produce?
Ans: Carbon dioxide, heat, and light.

16. What reaction is used in the hydrogenation of vegetable oils?
Ans: An addition reaction.
17. What are compounds containing only carbon and hydrogen called?
Ans: Hydrocarbons
18. What are groups that confer specific properties to a compound called?
Ans: Functional groups
19. What is a series of compounds with the same functional group called?
Ans: A homologous series.
20. What is the general formula for alkenes?
Ans: $C_n H_{2n}$
21. What type of reaction occurs when chlorine is added to hydrocarbons in sunlight?
Ans: A substitution reaction.
22. What is the common name for ethanol?
Ans: Alcohol.
23. What gas evolves when alcohols react with sodium?
Ans: Hydrogen.
24. What is the common name for ethanoic acid?
Ans: Acetic acid
25. What reaction forms esters?
Ans: The reaction of an acid and an alcohol forms esters.
26. What is the valency of carbon?
Ans: Four
27. Write the formula of first member of the homologous series to which C_5H6_{10} belongs.
Ans: C_2H_4
28. 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.
29. 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.
30. How many structural isomers can you draw for pentane?
Ans: 3 structural isomers.

Section -1I	2 Marks Questions	Q.No: 9 - 11

1. Explain combustion with an example.
Ans: Carbon, in all its allotropic forms, burns in oxygen to give carbon dioxide along with the release of heat and light.
$C + O_2 \rightarrow CO_2$ + heat and light
2. What are the two properties of carbon which lead to the huge number of carbon compounds we see around us?
Ans: Catenation, Tetravalency.
3. What are hydrocarbons? Classify them into three main types based on bonding.
Ans: Hydrocarbons contains carbon and hydrogen atoms.
1. Alkanes 2. Alkenes 3. Alkynes
4. Give one example of saturated and unsaturated compounds
Ans: Saturated hydro carbon: CH_2
Unsaturated hydro carbon: C_2H_2
5. Write any two properties of Ethanol (Alcohol).
Ans: Ethanol is a liquid at room temperature, good solvent.
6. Write any two properties of Ethanoic Acid
Ans: 5-8% solution of acetic acid in water is called vinegar and is used widely as a preservative in pickles, Preparation of esters.

7. Explain esterification reaction with an example

Ans: Esters are most commonly formed by reaction of an acid and an alcohol.

$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{C_2H_5OH} \xrightarrow{\text{conc. } H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + \underset{\text{water}}{H_2O}$$

8.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

9. 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.

10. 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.

$$CH_3OH + CO \xrightarrow{I_2-Rh} CH_3COOH$$

11. What is a homologous series? Explain with an example.

Ans: Series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called a homologous series. Example: CH_3OH, C_2H_5OH and C_3H_7OH.

The difference between the formulae of any two successive members is - CH_2.

12. Explain the nature of the covalent bond using the bond formation in CH_3Cl.

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

13. 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.

14. 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.

15. 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.

Section -1V	8 Marks Questions	Q.No: 161

1. Complete the following table.

No. of carbon in Hydro carbon	Alkane	Alkene	Alkyne
3	C_3H_8		
4		C_4H_8	
5			C_5H_8
6		C_6H_{12}	

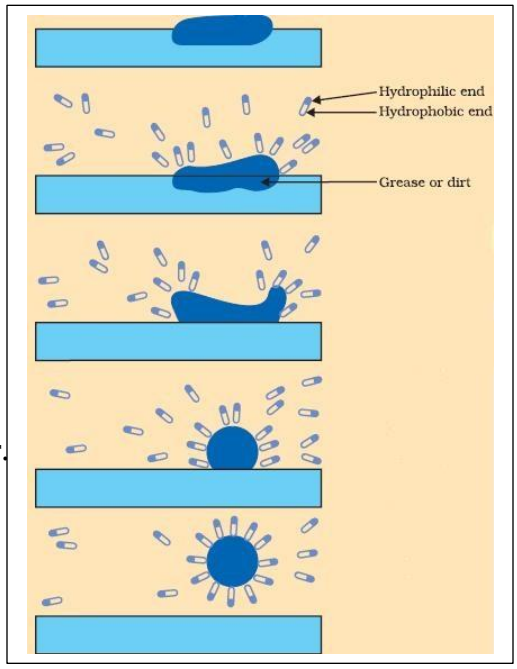
Ans:

No. of carbon in Hydro carbon	Alkane	Alkene	Alkyne
3	C_3H_8	**C_3H_6**	**C_3H_4**
4	**C_4H_{10}**	C_4H_8	**C_4H_6**
5	**C_5H_{12}**	**C_5H_{10}**	C_5H_8
6	**C_6H_{14}**	C_6H_{12}	**C_6H_{10}**

2. Explain the cleaning action of soap

(or)

Explain the mechanism of the cleaning action of soaps.



Ans: i) 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.

ii) 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.

iii) Inside water, these molecules have a unique orientation that keeps the hydrocarbon portion out of the water.

iv) 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.

v) 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.

vi) The micelles stay in solution as a colloid and will not come together to precipitate because of ion-ion repulsion.

vii) Thus, the dirt suspended in the micelles is also easily rinsed away.

3. Complete the following table.

Functional group	**Suffix**	**Formula of functional group**	**Example**
Alcohol			**CH_3OH**
Aldehyde	**- al**		
		- CO-	**CH_3COCH_3**
	- oic acid		**CH_3COOH**

Ans:

Functional group	Suffix	Formula of functional group	Example
Alcohol	**- ol**	**- OH**	CH_3OH
Aldehyde	- al	**- CHO**	**CH_3CHO**
Ketone	**- one**	- CO-	CH_3COCH_3
Carboxylic acid	- oic acid	**- COOH**	CH_3COOH

4. 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 $-CH_2$.

Example: CH_4, C_2H_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.

$CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$ (In the presence of sunlight)

5. How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?

(or)

How would you distinguish experimentally between a 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

6. Explain any two chemical properties of Carbon compounds.

Ans: i) Combustion

Carbon compounds, burns in oxygen to give carbon dioxide along with the release of heat and light. Saturated hydrocarbons will generally give a clean flame while unsaturated carbon compounds will give a yellow flame with lots of black smoke.

Example: $CH_4 + O_2 \rightarrow CO_2 + H_2O$ + heat and light

ii) Oxidation

Carbon compounds can be easily oxidised on combustion.

some substances are capable of adding oxygen to others. These substances are known as oxidising agents.

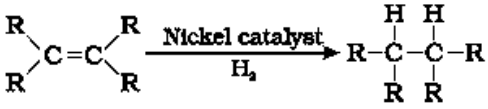
Example: In the presence of acidified KMNO4, alcohols are converted to carboxylic acids

$$CH_3 - CH_2OH \xrightarrow[\text{Or acidified } K_2Cr_2O_7 + \text{Heat}]{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3COOH$$

iii) Addition Reaction

Unsaturated hydrocarbons add hydrogen in the presence of catalysts such as palladium or nickel to give saturated hydrocarbons.

Addition reaction is commonly used in the hydrogenation of vegetable oils using a nickel catalyst.



iv) 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.

$CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$ (In the presence of sunlight)

(**NOTE:** Write any two chemical properties of carbon compounds)

7. 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.

12. Magnetic Effects of Electric Current

Structure: 1(8 Marks) = 8 Marks

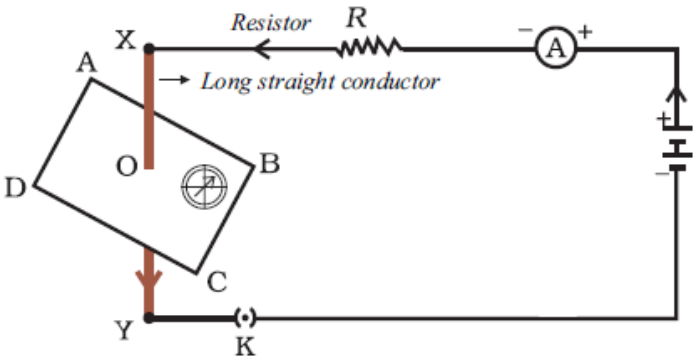
Section -1V	8 Marks Questions	Q.No: 17

1. Explain the procedure to show that compass needle is deflected on passing an electric current through a metallic conductor (Oersted's experiment) (or) How can it be shown with the help of an activity that a magnetic field is produced around a current carrying wire? (or) Describe with the help of a diagram an activity to show that a current carrying wire behaves like a magnet.

Ans:

Aim: To show that compass needle is deflected on passing an electric current through a metallic conductor.

Required Materials: Thick copper wire, Magnetic compass, Card board, Resistor, Ammeter, Key.



Procedure: 1. Take a straight thick copper wire and place it between the points X and Y in electric circuit as shown in the figure.
2. The wire XY is kept perpendicular to the plane of paper.
3. Horizontally place a small compass near to this copper wire.
4. See the position of its needle.
5. Pass the current through the circuit by inserting the key into the plug.

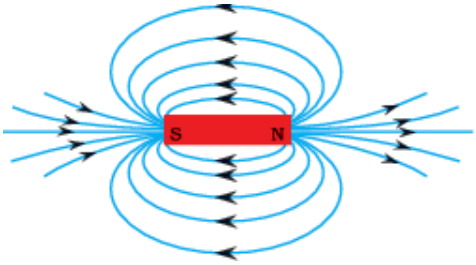
Observations: 1. We observe that the needle is deflected.
2. The electric current through the copper wire has produced a magnetic field around it.

2. Describe with the help of an activity to draw the magnetic field lines around a bar magnet.

Aim: To draw the magnetic field lines around a bar magnet.

Required Materials: Small compass, Bar magnet, White sheet, Drawing board.

Procedure:



1) Take a small compass and a bar magnet.
2) Place the magnet on a sheet of white paper fixed on a drawing board, using some adhesive material.
3) Mark the boundary of the magnet. Place the compass near the north pole of the magnet.
4) The south pole of the needle points towards the north pole of the magnet.
5) The north pole of the compass is directed away from the north pole of the magnet.
6) Mark the position of two ends of the needle.
7) Now move the needle to a new position such that its south pole occupies the position previously occupied by its north pole.

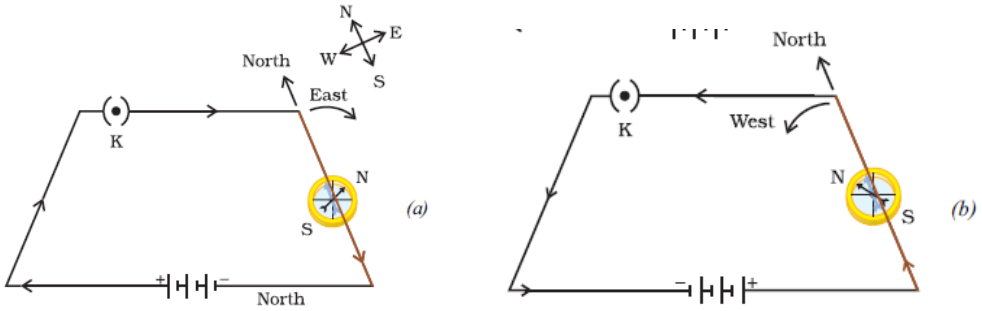
8) In this way, proceed step by step till you reach the south pole of the magnet as shown in Figure.
9) Join the points marked on the paper by a smooth curve. This curve represents a field line.
10) Repeat the above procedure and draw as many lines and will get a pattern shown in Figure.
11) These lines represent the magnetic field around the magnet. These are known as magnetic field lines.

Observation: The magnetic field lines around a bar magnet.

3. 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.

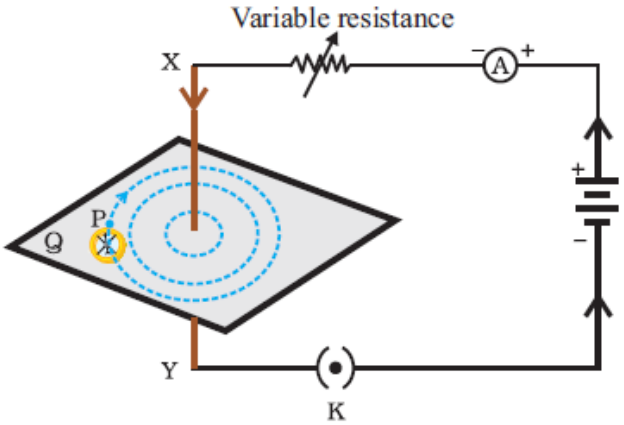


Procedure: 1. Take a long straight copper wire, two or three cells of 1.5 V each, and a plug key.
2. Connect all of them in series as shown in (a).
3. Place the straight wire parallel to and over a compass needle.
4. Plug the key in the circuit.
5. Observe the direction of deflection of the north pole 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.Describe an activity to draw the magnetic field produced 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.



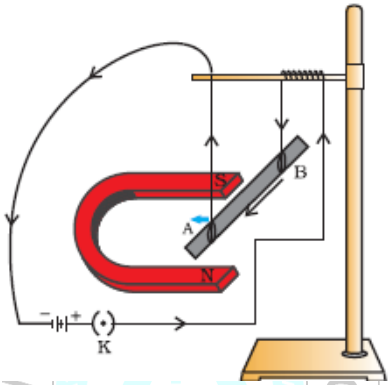
Procedure: 1. As shown in the figure, connecting the circuit.
2. Insert the thick wire through the centre, normal to the plane of a rectangular cardboard. Take care that the cardboard is fixed and does not slide up or down.
3. Connect the copper wire vertically between the points X and Y, as shown in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

4. Sprinkle some iron filings uniformly on the cardboard.
5. Keep the rheostat at a fixed position and note the current through the ammeter. Close the key so that a current flows through the wire. Ensure that the copper wire placed between the points X and Y remains vertically straight.
6. Gently tap the cardboard a few times.
7. We Observe that the iron filings align themselves showing a pattern of concentric circles around the copper wire
8. Place a compass at a point (say P) over a circle. The direction of the north pole of the compass needle would give the direction of the field lines produced by the electric current through the straight wire at point P.

5. Describe an activity on force experienced by a current-carrying conductor placed in a magnetic field.
(or) Describe with the help of a diagram an activity to show that a current-carrying conductor experiences a force when placed in a magnetic field.

Ans: Aim: To show that the force experienced by a current-carrying conductor placed in a magnetic field.

Required materials: Small aluminium rod, Strong horse-shoe magnet, Battery, Plug key, Vertical stand, Connecting wires.

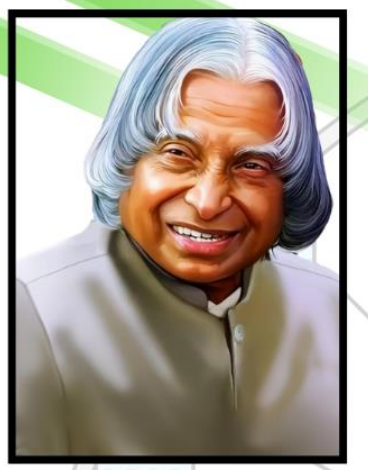


Procedure: 1. Take a small aluminium rod AB (of about 5 cm). Using two connecting wires suspend it horizontally from a stand, as shown in Fig.
2. Place a strong horse-shoe magnet in such a way that the rod lies between the two poles with the magnetic field directed upwards. For this put the north pole of the magnet vertically below and south pole vertically above the aluminium rod.
3. Connect the aluminium rod in series with a battery, a key and a rheostat.
4. Now pass a current through the aluminium rod from end B to end A.
5. We observed that the rod is displaced towards the left and rod gets displaced.
6. Reverse the direction of current flowing through the rod and observe the direction of its displacement. It is now towards the right.

Observations: The aluminium rod gets displaced because a force is exerted on the current-carrying rod when it is placed in a magnetic field.

Midde Srinivasa Rao
SA(Physics)
National Teacher Awardee - 2024

Lakshyam



Handbook

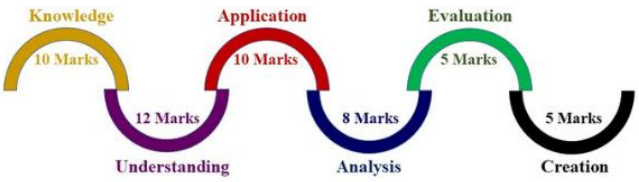
PHYSICAL SCIENCE

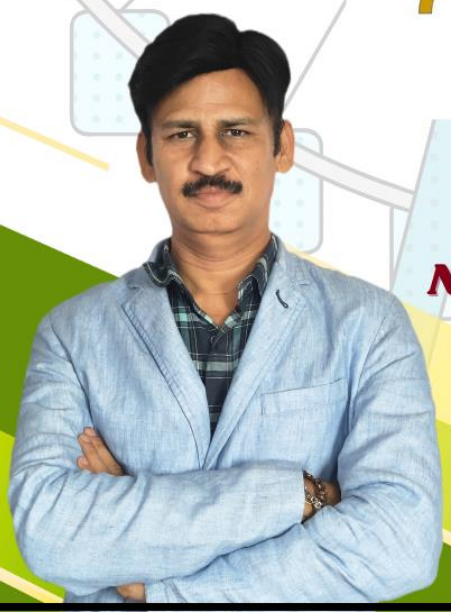
SSC PUBLIC EXAMINATIONS - 2026

"This book Transforms Doubts into Concepts and Efforts into Results!"

Chapter wise Weightage

Chemical Reactions and Equations	Light- Reflection and Refraction	Acids, Bases and Salts	Human Eye and Colourful World	Metals and Non-metals	Electricity	Carbon and its Compounds	Magnetic Effects of Electric Current
9 Marks	11 Marks	10 Marks	9 marks	9 marks	11 Marks	11 Marks	8 Marks





Midde Srinivasa Rao
SA(Physics)
National Teacher Awardee - 2024
S.P.S.M.High School Plus
Gudivada
ph: 9848143855
Visit: srini science mind