

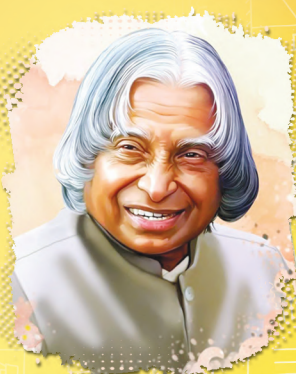
LAKSHYAM HANDBOOK



10th Class

PHYSICAL SCIENCE

SPECIAL EDITION



SSC Public Examinations - 2027

This Book Transforms Doubts into Concepts and Efforts into Results

WEIGHTAGE TO OBJECTIVE

OBJECTIVE	AWARENESS (60%)			SENSITIVITY (20%)			CREATIVITY (20%)			
	Knowledge	Understanding of Construct	Understanding of Process	Conflict Resolution	Open Mindedness	Collaboration	Generate innovative ideas	Fluency	Exploration	Combining Ideas / Concepts
% OF MARKS	60%			20%			20%			
MARKS	30			10			10			

CHAPTER WISE WEIGHTAGE

CHEMICAL REACTIONS AND EQUATIONS	LIGHT-REFLECTION AND REFRACTION	ACIDS, BASES AND SALTS	THE HUMAN EYE AND COLOURFUL WORLD	METALS AND NON-METALS	ELECTRICITY	CARBON AND ITS COMPOUNDS	MAGNETIC EFFECTS OF ELECTRIC CURRENT
8+1	4+4+2+1	4+4+1+1	8+1	8+1	8+2+1	8+2+1	8
9 MARKS	11 MARKS	10 MARKS	9 MARKS	9 MARKS	11 MARKS	11 MARKS	8 MARKS

50 MARKS + 28 MARKS (CHOICE)

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1. Chemical Reactions and Equations

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

Section -1	1 Mark Questions	Q.No: 1	A/S/C
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- A group of students is preparing fried snacks for distribution in a school exhibition. Different suggestions are given to prevent rancidity of fried snacks. Which suggestion should the group agree upon after discussion?
 A) Keep the snacks under sunlight. B) Pack the snacks in airtight packets.
 C) Store the snacks in an open container. D) Sprinkle water on the snacks before packing.
Ans: B) Pack the snacks in airtight packets
- Ramu and Latha prepared papads together. Latha chose a normal container, while Ramu preferred an airtight container to store the papads. Keeping rancidity in mind, whose choice should they accept?
Ans: Ramu
- Cooking oil is stored in an airtight bottle after use. What is the main reason?
 A) To increase its colour B) To prevent rancidity C) To increase viscosity D) To remove moisture
Ans: B) To prevent rancidity
- A shopkeeper packs potato chips by filling the packet with nitrogen gas. What is the main purpose?
 A) Increase weight B) Prevent oxidation and rancidity C) Improve taste D) Increase moisture
Ans: B) Prevent oxidation and rancidity
- To prevent food from getting rancid, chips manufacturers flush bags with a gas. Which non-reactive gas is most suitable?
 A) Oxygen B) Hydrogen C) Nitrogen D) Chlorine
Ans: C) Nitrogen
- While cleaning an old iron gate, Lakshmi notices a reddish-brown coating. Which condition is mainly responsible for this change?
 A) Heat only B) Moist air C) Dry nitrogen D) Sunlight
Ans: B) Moist air
- When Calcium oxide reacts with water heat is evolved. This reaction is known as ____
Ans: Exothermic reaction
- What happens when iron nail is exposed to moisture and water?
Ans: Iron nail rusts.
- Why should magnesium ribbon be cleaned before burning in air?
Ans: To remove the magnesium oxide layer from its surface
- A solution of substance "x" is used for white washing. What is "x"?
Ans: Calcium hydroxide (or) $\text{Ca}(\text{OH})_2$ (or) Slaked lime
- Design a balanced chemical equation with two reactants and one product.
Ans: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- Which of the statements about the reaction below are incorrect?

$$2\text{PbO}(\text{s}) + \text{C}(\text{s}) \rightarrow 2\text{Pb}(\text{s}) + \text{CO}_2(\text{g})$$
 (i) Lead is getting reduced. (ii) Carbon dioxide is getting oxidised.
 (iii) Carbon is getting oxidised. (iv) Lead oxide is getting reduced.
 A) (i) and (ii) B) (i) and (iii) C) (a), (b) and (c) D) all
Ans: B) (i) and (iii)
- $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$ The above reaction is an example of a ____
 A) combination reaction B) double displacement reaction
 C) decomposition reaction D) displacement reaction.
Ans: D) Displacement reaction
- What happens when dilute hydrochloric acid is added to iron fillings?
 A) Hydrogen gas and iron chloride are produced. B) Chlorine gas and iron hydroxide are produced.
 C) No reaction takes place. D) Iron salt and water are produced.

Ans: A) Hydrogen gas and iron chloride are produced.

15. Suggest one innovative household method to reduce food rancidity.

Ans: Store food in airtight containers with minimum exposure to air.

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

Ans: $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

17. Suggest one method to prevent corrosion.

Ans: Painting or Oiling or Greasing

18. 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.

19. 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.

20. Why, keeping food in air tight containers?

Ans: Oxidation of food can be slow down.

21. 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.

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

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

23. 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.

24. 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.

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

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

26. Why is photosynthesis considered an endothermic reaction?

Ans: It takes energy from sun or light.

27. 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.

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

Ans: Product.

29. "Mass can neither be created nor destroyed in a chemical reaction." This is is ____

Ans: Law of conservation of mass

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

Ans: Quick lime.

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

Ans: Decomposition reaction.

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

Ans: A displacement reaction

33. 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.

34. What type of reaction takes place during respiration?

Ans: Exothermic reaction

35. Identify the substance that is oxidized and the substance that is reduced in the following reaction:



Ans: Hydrogen (H_2) is oxidized to H_2O . Copper oxide (CuO) is reduced to Cu.

36. When calcium oxide reacts with water, heat is evolved. This reaction is known as ____.

Ans: Exothermic reaction

37. Combine the symbols Ca, C and O to get the formula of the substance which gives the wall a shiny white

finish in whitewashing.

Ans: Calcium carbonate (or) CaCO_3

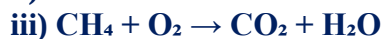
Section -1V

8 Marks Questions

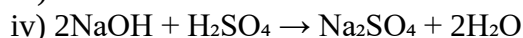
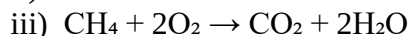
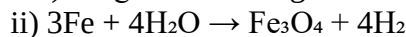
Q.No: 16 A

Awareness

1. Balance the following chemical equations:



Ans: i) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$



2. Explain four types of chemical reactions with one example each. (or)

Explain the following with an example.

i) Chemical combination

ii) Chemical decomposition

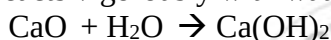
iii) Chemical displacement

iv) Chemical double displacement (or)

State and explain four types of chemical reactions with an example each.

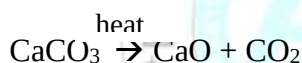
Ans: i) Combination reaction: A reaction in which a single product is formed from two or more reactants is known as a combination reaction.

Ex: Calcium oxide reacts vigorously with water to produce slaked lime.



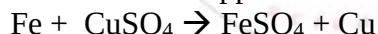
ii) Decomposition reaction: A reaction in which a single substance decomposes to give two or more substances is known as decomposition reaction.

Ex: Decomposition of calcium carbonate to calcium oxide and carbon dioxide on heating.



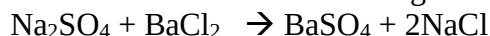
iii) Displacement reaction: The reaction in which an element has displaced or removed another element from the molecule is called displacement reaction.

Ex: Iron has displaced another element copper from copper sulphate solution.

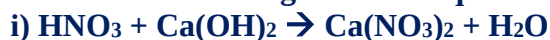


iv) Double displacement reaction: The reaction in which there is an exchange of ions between the reactants are called double displacement reactions.

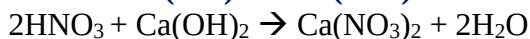
Ex: Sodium sulphate and Barium chloride are reacting and exchange their ions.



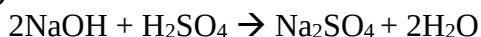
3. Balance the following chemical equations



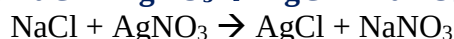
Ans: (i) $\text{HNO}_3 + \text{Ca(OH)}_2 \rightarrow \text{Ca(NO}_3)_2 + \text{H}_2\text{O}$



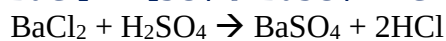
(ii) $\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$



(iii) $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$



(iv) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{HCl}$



4. Balance the following chemical equations





- Ans:** i) $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
 ii) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$
 iii) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 iv) $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$

5. Balance the following chemical equations

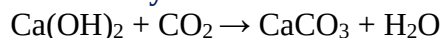
- i) $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
 ii) $\text{Zn} + \text{AgNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{Ag}$
 iii) $\text{Al} + \text{CuCl}_2 \rightarrow \text{AlCl}_3 + \text{Cu}$
 iv) $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + \text{KCl}$

- Ans:** i) $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
 ii) $\text{Zn} + 2\text{AgNO}_3 \rightarrow \text{Zn}(\text{NO}_3)_2 + 2\text{Ag}$
 iii) $\text{Al} + \text{CuCl}_2 \rightarrow \text{AlCl}_3 + \text{Cu}$
 iv) $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{KCl}$

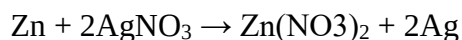
6. Write the balanced chemical equations for the following reactions.

- (a) Calcium hydroxide + Carbon dioxide $\rightarrow$ Calcium carbonate + Water
 (b) Zinc + Silver nitrate $\rightarrow$ Zinc nitrate + Silver
 (c) Aluminium + Copper chloride $\rightarrow$ Aluminium chloride + Copper
 (d) Barium chloride + Potassium sulphate $\rightarrow$ Barium sulphate + Potassium chloride

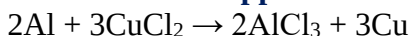
- Ans:** (a) Calcium hydroxide + Carbon dioxide $\rightarrow$ Calcium carbonate + Water



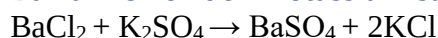
- (b) Zinc + Silver nitrate $\rightarrow$ Zinc nitrate + Silver



- (c) Aluminium + Copper chloride $\rightarrow$ Aluminium chloride + Copper



- (d) Barium chloride + Potassium sulphate $\rightarrow$ Barium sulphate + Potassium chloride



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

Ans:

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

8. Explain the following terms with one example each.

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

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

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

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

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

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



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



9. Light - Reflection and Refraction

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

Section -1	1 Mark Questions	Q.No: 6	A/S/C
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1. Observe the following statements.

Pavan: Concave mirror will be used as rear-view mirror.

Kiran: Convex mirror will be used as rear-view mirror.

Whose statement is correct?

Ans: Kiran

2. Observe the following statements.

Vani: Speed of light in Diamond is more than Air.

Rani: Speed of light in Air is more than Diamond.

Whose statement is correct?

Ans: Rani

3. Observe the following statements.

Raju: Speed of light in Benzene is more than Air.

Rani: Speed of light in Air is more than Benzene.

Whose statement is correct?

Ans: Raju

4. I am a point on lens. What a light ray passes through me it will not deviate. Who am I?

Ans: Optical centre

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

Ans: Concave lens (or) Diverging lens.

6. Find the radius of curvature of a Convex mirror whose focal length is 16 cm.

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

7. Find the power of a Convex lens having a focal length of 50 cm.

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

8. Ramu said "power of my spectacles is 80 cm". Ask him a question to correct his misconception.

Ans: Is the power of spectacles measured in centimetres or dioptres?

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

A) 0.66 m

B) 0.66 cm

C) 0.77 m

D) 0.77 cm

Ans: A) 0.66 m

10. Write lens formula.

Ans: $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

11. Write the formula of Magnification.

Ans: $m = \frac{hi}{ho} = \frac{v}{u}$

12. Which mirror is used in solar cookers?

A) Plane mirror

B) Convex mirror

C) Concave mirror

D) Cylindrical mirror

Ans: C) Concave mirror

13. Ravi observes his legs appear shorter when standing in a swimming pool. This is due to:

A) Reflection of light

B) Refraction of light

C) Dispersion of light

D) Scattering of light

Ans: B) Refraction of light

14. An ambulance uses a special mirror to observe a wide area behind it. Identify the mirror.

A) Plane mirror

B) Concave mirror

C) Convex mirror

D) Cylindrical mirror

Ans: C) Convex mirror

15. 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 $(f) = \frac{R}{2} = \frac{20}{2} = 10 \text{ cm}$

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

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

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

17. 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

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

18. 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

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

Ans: Convex lens.

20. 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.

21. 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: 10

Sensitivity

1. Meenu stated that a convex lens always forms real images. How would you guide her to correct the misconception by asking two simple questions?

Ans: i) Can a convex lens form a virtual image when the object is placed between the optical centre and focus?
ii) Can this virtual image be obtained on a screen?

2. "Light travels with the same speed in any medium." Varun made this statement during a discussion. Formulate two probing questions that would guide him to realize his misconception.

Ans: i) Does light change its speed when it travels from air into glass?
ii) Why does a light ray bend when it passes from one transparent medium to another?

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

Ans: 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. Write any two applications/uses 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)

5. Why should we avoid looking directly at the sun through a magnifying glass?

Ans: A magnifying glass can concentrate sunlight onto the retina and cause serious damage to the eyes. Therefore, we should not look directly at the Sun through it.

6. How would you use refraction to make a small object appear larger?

Ans: Place the small object between the optical centre and principal focus of a convex lens. It forms a virtual, erect and enlarged image.

7. "Speed of light doesn't depend on refractive index of medium". Bhavan made this statement during a discussion. Formulate two probing questions that would guide him to realize her misconception.

Ans: i) Does light travel at the same speed in air, water and glass?
ii) What happens to the speed of light when the refractive index of a medium increases?

8. Design a simple experiment to show refraction using materials available at home.

Ans: Place a pencil in a transparent glass of water. Observe it from the side. The pencil appears bent at the water surface due to the refraction of light.

9. Write any two applications of Convex mirrors?

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

10. 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.

11. Invent a device that uses a Concave mirror for daily life. State its purpose.

Ans: Solar cooker using a concave mirror. The concave mirror concentrates sunlight at its focus to produce heat for cooking food.

12. How would you use refraction to make a small object appear larger?

Ans: Place the small object between the optical centre and principal focus of a convex lens. It forms a virtual, erect and enlarged image.

13. While observing a classmate's experiment with a Convex lens, you notice that the image on the screen becomes larger and then suddenly disappears as the object is moved towards the lens. Predict the position of the object with respect to the lens.

Ans: The object is being moved from beyond the focus towards the principal focus (F). At the focus, the image is formed at infinity, so it disappears from the screen.

14. The magnification produced by a 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.

15. 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.

16. A student says, "The image formed by every mirror is always erect."

Frame two probing questions to help the student realize the misconception.

Ans: i) Does a concave mirror always form an erect image?

ii) What is the nature of the image formed when an object is placed beyond the focus of a concave mirror?

17. "The power of a convex lens is negative." A student makes this statement.

Frame two probing questions to correct the idea.

Ans: i) What is the sign of the focal length of a convex lens?

ii) Using $P=1/f$, what is the sign of the power of a convex lens?

18. "The focal length and radius of curvature of a spherical mirror are equal."

Frame two probing questions to correct this misconception.

Ans: i) What is the relation between focal length and radius of curvature of a spherical mirror?

ii) If $R=20$ cm, what will be its focal length?

19. An object is placed between the pole and focus of a concave mirror. A student predicts a real image. Ask two questions to correct the misconception.

Ans: i) Can the image formed by a concave mirror when the object is between P and F be obtained on a screen?

ii) Is the image formed in this position real or virtual?

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

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

21. 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.

22. 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.

23. 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.

24. 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.

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

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

26. 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.

Section -1II

4 Marks Questions

Q.No: 12 A

Awareness

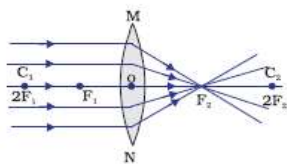
1. Draw the ray diagrams of image formed when the object is placed in front of a bi-convex lens in the following positions.

(a) At infinity

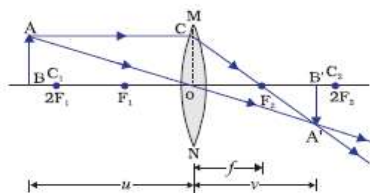
(b) Beyond $2F_1$ (c) At $2F_1$ (d) Between F_1 and $2F_1$ (e) At F_1

(f) Between F and Optical centre O

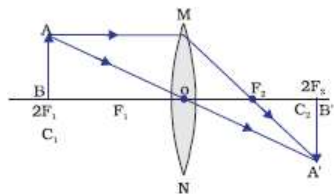
Ans:



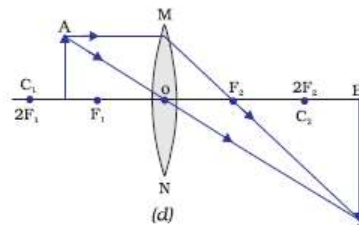
(a)



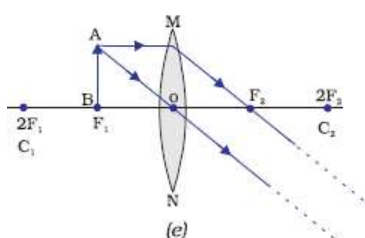
(b)



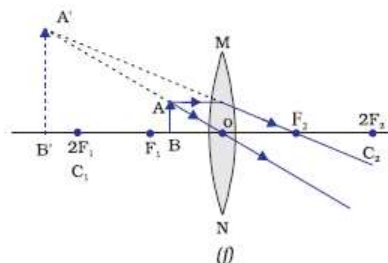
(c)



(d)



(e)



(f)

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

(a) At infinity

(b) Beyond C

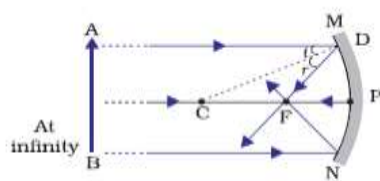
(c) At C

(d) Between C and F

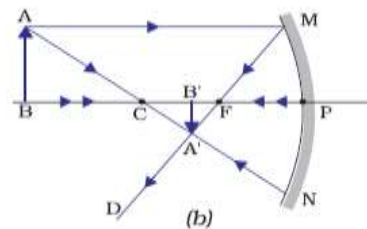
(e) At F

(f) Between P and F

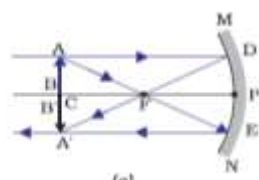
Ans:



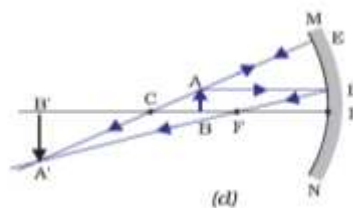
(a)



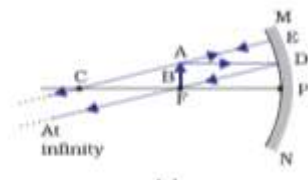
(b)



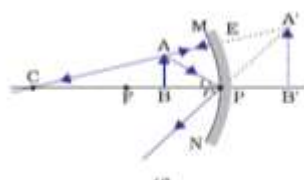
(c)



(d)



(e)



(f)

Section - III

4 Marks Questions

Q.No: 14

Creativity

1. An object is placed beyond $2F$ of a convex lens. Where should the object be moved to obtain the following images?

- i) Real and enlarged image
- ii) Real and same-size image
- iii) Virtual and enlarged image
- iv) Highly diminished and point-sized image

Ans: i) Between F_1 and $2F_1$.

ii) At $2F_1$.

iii) Between F_1 and the optical centre (O).

iv) At infinity.

2. Vivek wants to create a virtual and erect image by using the following lenses or mirrors.

Lens/Mirror	Object to be placed at
Concave mirror	
Convex mirror	
Concave lens	
Convex lens	

Ans:

Lens/Mirror	Object to be placed at
Concave mirror	Between Pole and Focus
Convex mirror	Anywhere in front of the mirror
Concave lens	Anywhere in front of the lens
Convex lens	Between Optical Centre and Focus

3. Reflection has many useful applications. Suggest any four examples where refraction is used in daily life.

Ans: Four daily-life applications of refraction:

- a) Spectacles
- b) Camera lenses
- c) Microscopes
- d) Telescopes

4. After performing the experiment on refraction through a rectangular glass slab, Hanok made the following statements:

- i) “The light ray doesn’t undergo any refraction during this experiment.”
- ii) “The emergent ray always comes out in a different direction from the incident ray.”

As Hanok’s classmate, frame one question for each statement that would help him identify and correct his misconceptions on his own.

Ans: i) Why does a light ray change its direction when it passes obliquely from air into a glass slab?

ii) Why is the emergent ray parallel to the incident ray in a rectangular glass slab even though it undergoes refraction?

5. Observe the table and answer the following questions:

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

(Note: Speed of light in vacuum is $3 \times 10^8 \text{ m s}^{-1}$)

- (i) What is the speed of light in Ruby?
- (ii) Calculate the speed of light in air?
- (iii) Which material medium light travels faster?
- (iv) In which material medium the speed of light is least?

Ans: i) $1.75 \times 10^8 \text{ m s}^{-1}$

ii) $2.999 \times 10^8 \text{ m s}^{-1}$ (or) $3 \times 10^8 \text{ m s}^{-1}$

iii) Air

iv) Ruby

6. Observe the table and answer the following questions:

Material medium	Air	Water	Benzene	Diamond
Speed of light in the medium (m/s)	3×10^8	$(9/4) \times 10^8$	2×10^8	$(5/4) \times 10^8$

(Note: Speed of light in Vacuum is $3 \times 10^8 \text{ m/s}$)

- (i) In which material medium light travels faster?
- (ii) In which material medium light travels with the least speed?
- (iii) Which material medium has the least refractive index?

(iv) Calculate the refractive index of Benzene?

Ans: i) Air

ii) Diamond

iii) Air

iv) Speed of light in Benzene (v) = $C/n = 3 \times 10^8 / 1.5 = 2 \times 10^8$ m/s

7. 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 the focus F		Real and inverted
Beyond C		Diminished	
	Beyond C		Real and inverted
Between P and F		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
Beyond C	Between F and C	Diminished	Real and inverted
Between C and F	Beyond C	Enlarged	Real and inverted
Between P and F	Behind the mirror	Enlarged	Virtual and erect

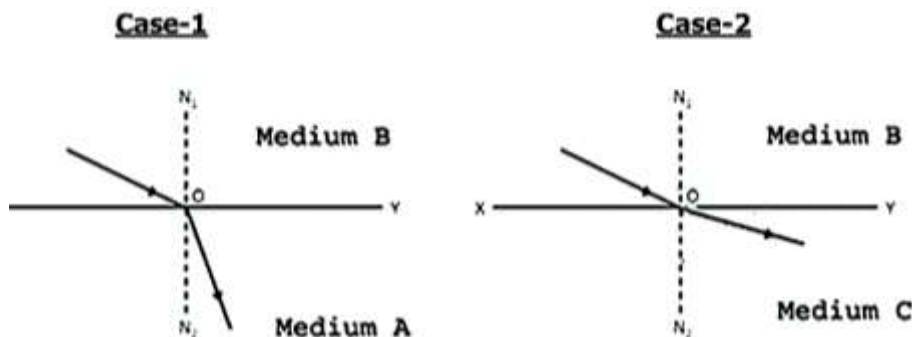
8. Fill the table following, which is related to convex lens.

Position of the Object	Position of the Image	Relative Size of the image	Nature of the image
Beyond $2F_1$			Real and 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

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



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) $C < B < A$

2. Acids, Bases and Salts

Structure: 2(4 Marks) + 2(1 Marks) = 10 Marks

Section -1	1 Mark Questions	Q.No: 2 - 3	A/S/C
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1. A student finds that the pH of a solution is 3. Suggest one way to neutralize it.

Ans: Add a base.

2. While preparing a dilute sulphuric acid solution, a group of students decides to follow the correct laboratory procedure. Which action should they perform together?

- A) Add water slowly to concentrated acid. B) Add concentrated acid slowly to water.
C) Mix acid and water at the same time. D) Heat the acid before dilution.

Ans: B) Add concentrated acid slowly to water.

3. A student wants to test whether a given solution is acidic or not. Suggest one safe and simple test.

Ans: Use blue litmus paper.

4. During a Swachh Seva Camp, a group of students is assigned the task of making the school drinking water safe. Which action best demonstrates sensitivity towards the health of others?

- A) Mixing bleaching powder to disinfect the drinking water. B) Adding washing soda to the drinking water.
C) Storing bleaching powder packets near the tank. D) Decorating the water tank with posters.

Ans: A) Mixing bleaching powder to disinfect drinking water.

5. Which indicator turns pink in a basic solution?

Ans: Phenolphthalein

6. A solution turns red litmus blue, its pH is likely to be

- A) 1 B) 4 C) 5 D) 7

Ans: D) 7

7. What simple test would you perform to identify an unknown acidic solution?

Ans: Test with blue litmus paper.

8. Bhanu finds that the pH value of a solution is 8. To neutralize it, suggest a suitable way for student.

Ans: Add a suitable acid.

9. A solution reacts with crushed egg-shells to give a gas that turns lime-water milky. The solution contains

- A) NaCl B) HCl C) LiCl D) KCl

Ans: B) HCl

10. The pH of a neutral solution is _____

Ans: 7

11. Complete the following equation

Acid + Base $\rightarrow$ Salt + _____

Ans: Water

12. What type of reaction takes place in stomach when an antacid tablet is consumed _____

Ans: Neutralisation reaction

13. _____ gas is released on the reaction of zinc granules with dilute sulphuric acid.

Ans: Hydrogen gas

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

Ans: It changes into a hard mass of gypsum.

15. Bases which are soluble in water are called _____.

Ans: Alkali

16. Write the formula of bleaching powder.

Ans: CaOCl₂

17. What is a neutralization reaction?

Ans: The reaction between an acid and a base to give a salt and water is known as a neutralisation reaction.

18. What is the common name of the compound CaOCl₂?

Ans: Bleaching powder

19. A solution turns red litmus blue, its pH is likely to be

- A) 1 B) 4 C) 5 D) 10

Ans: D) 10

20. Write the formula of Plaster of Paris.

Ans: $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$

21. Which one of the following types of medicines is used for treating indigestion? ()

A) Antibiotic

B) Analgesic

C) Antacid

D) Antiseptic

Ans: C) Antacid

22. The process of mixing an acid or base with water is called _____.

Ans: dilution

23. The nature of Magnesium hydroxide is _____.

Ans: Basic nature

24. The pH value of a solution is 10. What is its colour in the presence of Methyl Orange Indicator?

Ans: Yellow

25. Which of the following is not an olfactory indicator?

A) Clove Oil

B) Groundnut Oil

C) Onion

D) Vanilla essence

Ans: B) Groundnut Oil

26. What is the colour of phenolphthalein indicator in basic solution?

Ans: Pink colour

27. While preparing a dilute sulphuric acid solution, a group of students decides to follow the correct laboratory procedure. Which action should they perform together?

A) Add water slowly to concentrated acid.

B) Add concentrated acid slowly to water.

C) Mix acid and water at the same time.

D) Heat the acid before dilution.

Ans: B) Add concentrated acid slowly to water.

28. Give example for an acid

Ans: Hydrochloric acid (or) HCl

29. Give example for a base

Ans: Sodium hydroxide (or) NaOH

30. Give example for salt

Ans: Sodium chloride (or) NaCl

31. Write the gypsum formula.

Ans: $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

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

Ans: Dry slaked lime (or) $\text{Ca}(\text{OH})_2$

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

Ans: Carbon dioxide or CO_2

34. Give any one example for neutralisation reaction?

Ans: $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

35. What is the range of pH scale?

Ans: 0 – 14

36. What types of medicines are used for treating indigestion?

Ans: Antacid

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

Ans: Washing soda (or) sodium carbonate.

38. Why are toothpastes generally basic?

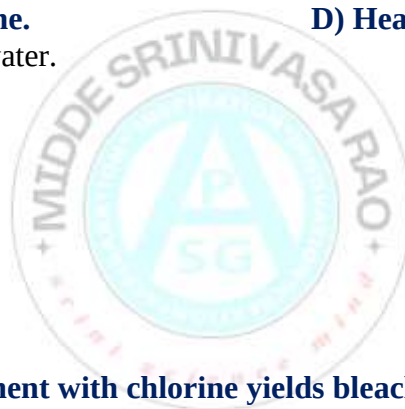
Ans: Toothpaste neutralises the excess acid and prevents tooth decay.

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

Ans: It changes into a hard mass of gypsum.

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

Ans: 10



Section -III

4 Marks Questions

Q.No: 13

Sensitivity

1. Rohan said washing soda will be used to bake a cake and baking soda to soften hard tap water. His sister Sowmya disagrees with him.

Answer the following

1. In this context, who is correct?
2. Write the chemical formula of baking soda.
3. Write any two uses of the substance that Rohan chose to bake a cake.

Ans: 1. Sowmya is correct.

2. NaHCO_3

3. Used in baking powder to make cakes soft and spongy. Used as an antacid to neutralise excess stomach acid.

2. A) In a school laboratory, Group A argues that adding water to acid is the correct method to dilute concentrated acid, while Group B argues that adding acid to water is the correct method.

Whose argument is correct? Why?

B) Arun said that hydrochloric acid turns the colour of the blue litmus.

Is this statement correct under all conditions? Justify your answer.

Ans: A) Group B is correct. Concentrated acid should be added slowly to water with constant stirring because dilution is highly exothermic. Adding water to concentrated acid may cause splashing.

B) No. Hydrochloric acid turns moist blue litmus red. Dry HCl gas does not change dry blue litmus paper because H^+ ions are produced only in the presence of water.

3. Ammalu measure the pH of three solutions.

a) Lemon juice = 2 b) Milk = 6.5 c) Soap solution = 10

Arrange them in increasing order of acidity in her view and give your reasoning.

Ans: Increasing order of acidity: Soap solution < Milk < Lemon juice

Lower pH indicates greater acidity. Therefore, lemon juice (pH=2) is most acidic, while soap solution (pH=10) is basic.

4. Explain the importance of pH in

a) Human digestion b) Tooth decay c) Agriculture d) Self-defence by animals

Ans: a) **Human digestion:** HCl in the stomach helps digestion. Excess acid is neutralised by antacids.

b) **Tooth decay:** Tooth decay begins when mouth pH falls below 5.5. Basic toothpaste helps neutralise acids.

c) **Agriculture:** Plants require a suitable soil pH for healthy growth. Soil pH can be corrected using suitable substances.

d) **Self-defence by animals:** Bee or ant stings inject acidic substances. Mild bases such as baking soda can help neutralise the effect.

5. A milkman adds a very amount of baking soda to fresh milk.

a) Why does shift the pH of the fresh milk 6 to slightly alkaline?

b) Why does this milk take a long time to set as curd?

Ans: a) 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.

b) 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.

6. Analyze pH effects in food

a) A friend claims that all sour foods are harmful because they contain acids.

b) Evaluate the statement scientifically and provide examples.

Ans: a) The claim is incorrect. Not all sour foods are harmful simply because they contain acids.

b) Many sour foods contain weak natural acids and are safe in moderate amounts. For example, lemon contains citric acid, curd contains lactic acid, and vinegar contains acetic acid. However, excessive consumption of acidic foods may damage tooth enamel or cause acidity.

7. 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.

8. 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

9. 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.

10. 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.

11. 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 soil

- i) Plants require a specific pH range for their healthy growth.

12. Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd?

- Ans:** The p^H of milk is 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.

13. Why does tooth decay start when the pH of mouth is lower than 5.5?

- Ans:** 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.
 iv) Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating.

14. How does the flow of acid rain into a river make the survival of aquatic life in a river difficult?

- Ans:** i) Living organisms can survive only in a narrow range of pH change.
 ii) When pH of rain water is less than 5.6, it is called acid rain.
 iii) When acid rain flows into the rivers, it lowers the pH of the river water.
 iv) The survival of aquatic life in such rivers becomes difficult.

15. Write an activity to show the water of crystallization in salts.

Ans: Aim: To show the water of crystallisation.

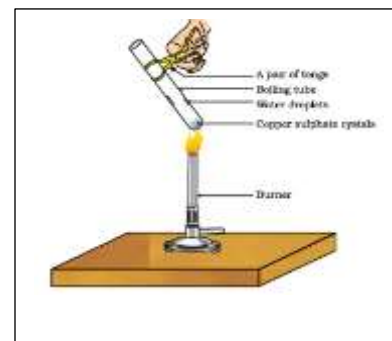
Required Materials: Copper sulphate crystals, Test tube, Burner, A pair of tongs, water.

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.

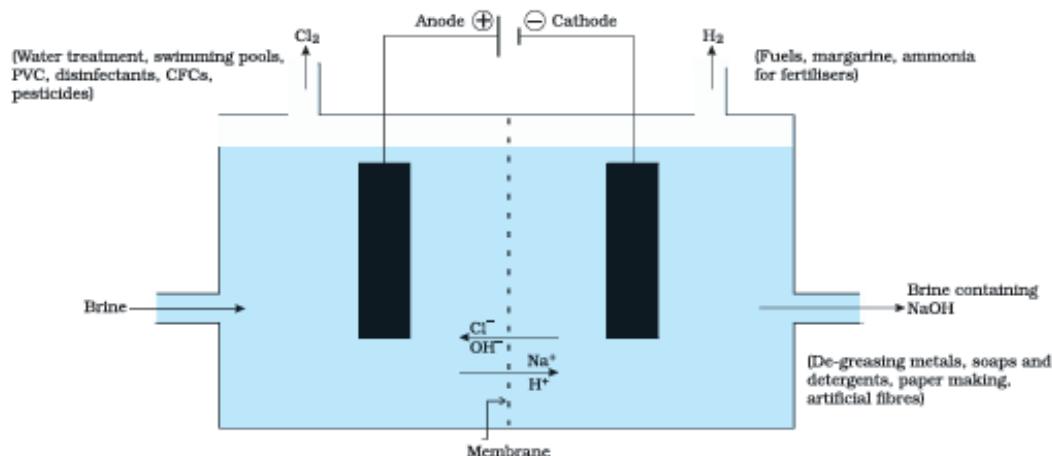
Observation:

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



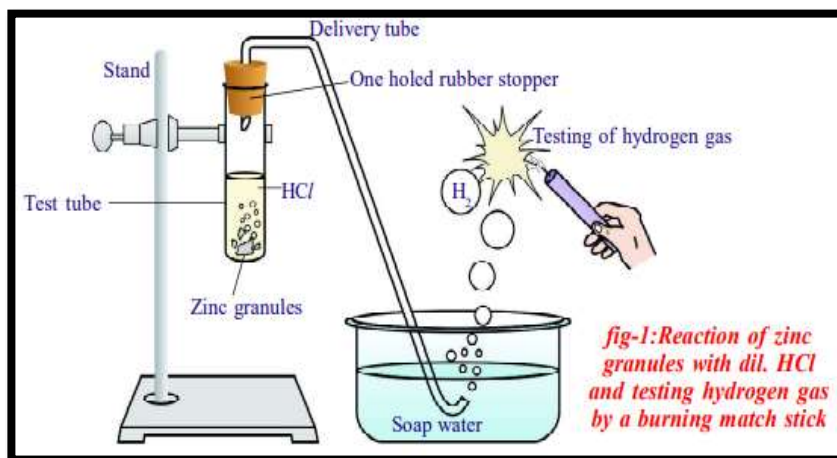
1. Draw a neat diagram to show the Chlor-Alkali Process.

Ans:



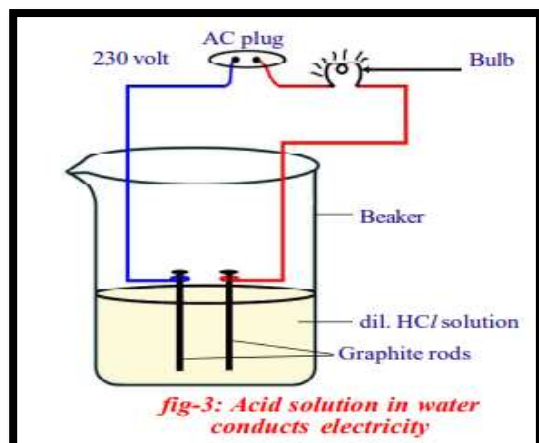
2. Draw a neat diagram to show the reaction of zinc granules with dilute sulphuric acid (or)
 Draw a diagram of arrangement of apparatus for the reaction of acids with metals (or)
 Draw the diagram that showing the reaction of zinc granules with dil.HCl and testing hydrogen gas by a burning matchstick.

Ans:



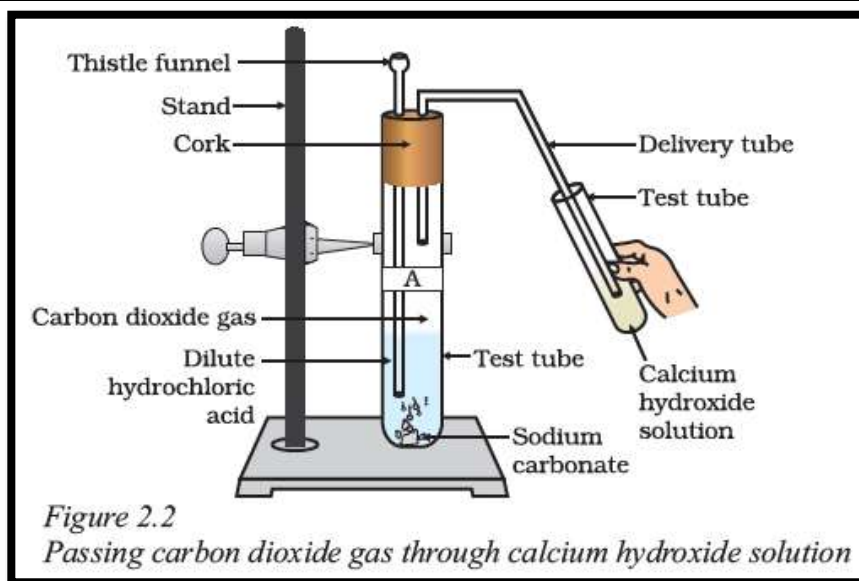
3. Draw the diagram which shows that acid solution in water conducts electricity.

Ans:



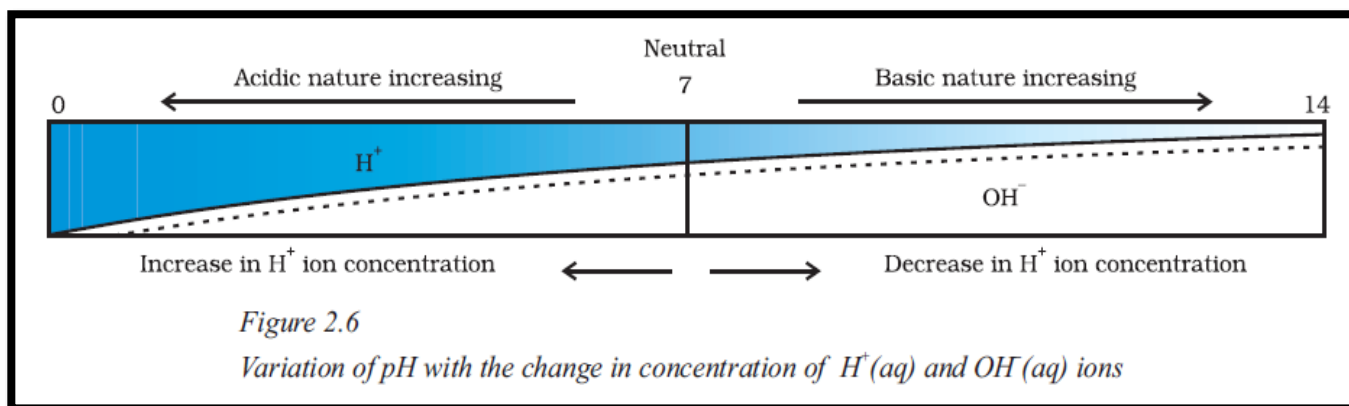
4. Draw a diagram of passing carbon dioxide gas through calcium hydroxide solution when metal carbonates or metal hydrogen carbonates react with acids. (or) Draw a neat labelled diagram which shows the reaction of metal carbonates and metal hydrogen carbonates with acids.

Ans:



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

Ans:



10. The Human Eye and The Colourful World

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

Section -1	1 Mark Questions	Q.No: 7	A/S/C
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1. Which constituent colour of white light undergoes the maximum deviation when passing through a glass prism?

- A) Violet B) Red C) Green D) Yellow

Ans: A) Violet

2. Write the atmospheric phenomenon which explains advance sunrise and delayed sunset.

Ans: Atmospheric refraction

3. A person can clearly see nearby objects but not distant objects. This defect is called

- A) Hypermetropia B) Myopia C) Presbyopia D) Cataract

Ans: B) Myopia

4. Which colour of light is scattered the least in the atmosphere?

- A) Violet B) Blue C) Green D) Red

Ans: D) Red

5. Myopia is correct using a _____

Ans: Concave lens

6. What is meant by least distance of distinct vision?

Ans: 25 cm

7. Different suggestions are given to correct the vision of a person whose far point is 80 cm from the eye. Which suggestion should the group agree upon after discussion?

- A) Use a Convex lens of + 1.25 D B) Use a concave lens of – 1.25 D
C) Use a concave lens of – 0.8 D D) Use a convex lens of + 0.80 D

Ans: B) Concave lens of –1.25 D

8. Rajani: Stars twinkle because of atmospheric refraction.

Siva: Planets twinkle because of atmospheric refraction.

Which statement is correct?

- A) Only Rajani's statement is correct B) Only Siva's statement is correct
C) Both Rajani's and Siva's statements are correct D) Both Rajani's and Siva's statements are incorrect

Ans: A) Only Rajani's statement is correct

9. During a free eye-checkup camp, a group of students discusses how to help people with refractive defects.

Which suggestion best demonstrates concern for improving their vision?

- A) Recommend a concave lens for a person with myopia and a convex lens for a person with hypermetropia
B) Recommend a convex lens for both myopia and hypermetropia.
C) Recommend a concave lens for both myopia and hypermetropia.
D) Advise both people not to use spectacles.

Ans: A) Concave lens for myopia and convex lens for hypermetropia

10. A person has hypermetropia and can see nearby objects clearly only up to 1 m. Calculate the power of the lens required to enable the person to see objects clearly at the normal near point of 25 cm.

Ans: Given $u = -25$ cm, $v = -100$ cm

$$1/f = 1/v - 1/u$$

$$1/f = -1/100 + 1/25 = 3/100$$

$$f = 33.3 \text{ cm} = 0.333 \text{ m}$$

$$P = 1/f = 1/0.333 = +3 \text{ D}$$

11. A person can clearly see nearby objects but not distant objects. This defect is called:

- A) Hypermetropia B) Myopia C) Presbyopia D) Cataract

Ans: B) Myopia

12. The ability of the eye lens to change its focal length is known as:

- A) Refraction B) Accommodation C) Light Dispersion D) Light Reflection

Ans: B) Accommodation

13. The retina acts as the:

- A) Lens of the eye B) Screen where image is formed C) Colour filter D) Transparent covering

Ans: B) Screen where image is formed

14. Which lens is used to correct hypermetropia?

- A) Concave lens B) Convex lens C) Cylindrical lens D) Bifocal lens

Ans: B) Convex lens

15. The least distance of distinct vision for a healthy young adult is:

- A) 25 m B) 2.5 cm C) 25 cm D) 2.5 m

Ans: C) 25 cm

16. The change in focal length of an eye lens is caused by an action of the _____

- A) Cornea B) Iris C) Pupil D) Ciliary muscles

Ans: D) Ciliary muscles

17. The human eye forms the image of an object on its...

- A) Cornea B) Iris C) Pupil D) Retina

Ans: D) Retina

18. The splitting of white light into different colours is called _____.

Ans: Dispersion

19. The blue colour of the sky is due to _____ of sunlight.

Ans: Scattering of sunlight

20. The formation of rainbow is due to _____.

Ans: Dispersion

21. The twinkling of stars is due to _____.

Ans: Atmospheric refraction.

22. What type of image is formed by the eye lens?

Ans: Real and inverted image.

23. Which defect makes distant objects appear blurred?

Ans: Myopia

24. Which defect makes nearby objects appear blurred?

Ans: Hypermetropia

25. Write the atmospheric phenomenon which explains advance sunrise and delayed sunset.

Ans: Atmospheric refraction

26. Which constituent colour of white light undergoes the maximum deviation when passing through the glass prism?

Ans: Violet colour

27. Why does the human eye have a crystalline lens?

- A) To absorb light B) To focus light on the retina C) To increase the size of the eye D) To produce light

Ans: B) To focus light on the retina

28. Why does the Sun appear reddish during sunrise?

- A) Reflection of sunlight B) Scattering of shorter wavelengths
C) Refraction by clouds D) Dispersion by water droplets

Ans: B) Scattering of shorter wavelengths

29. The colour of the sky appears blue mainly because:

- A) Reflection by the atmosphere B) Scattering of blue light C) Refraction by air D) Dispersion by dust

Ans: B) Scattering of blue light

30. The change in the curvature of the eye lens can thus change its _____.

Ans: Focal length

31. Which colour reaches us directly at sunrise?

Ans: Red colour

32. A person myopic eye cannot see objects beyond 1.2 m distinctly. What should be the type of corrective lens used to restore proper vision?

Ans: A concave lens

33. What is meant by cataract?

Ans: The condition of the crystalline lens of old age people becomes milky and cloudy is called cataract.

34. What is presbyopia?

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

35. What is the far point and near point of the human eye with normal vision?

Ans: Far point: **Infinity**; Near point: **25 cm**.

36. What is the direction of rainbow formation? What is the position of red colour in rainbow?

Ans: A rainbow is formed in the direction opposite to the Sun. Red colour is at the outer/top edge of the rainbow.

37. A person has hypermetropia and can see nearby objects clearly only up to 1 m. Calculate the power of the lens required to enable the person to see objects clearly at the normal near point of 25 cm.

Ans: $u = -25 \text{ cm}$, $v = -100 \text{ cm}$
 $f = 100/3 = 0.333 \text{ m}$
 $P = 1/f = +3 \text{ D}$

38. Danger signals are red in colour. Why?

Ans: Red light has the longest wavelength and is scattered the least by air, fog and smoke. Hence, it can be seen from a longer distance.

39. The minimum distance, at which objects can be seen most distinctly without strain is called _____

Ans: near point or least distance of distinct vision.

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

Ans: Tyndall effect

Section -IV

8 Marks Questions

Q.No: 15 A

Awareness

1. What is Myopia? How can it be corrected? Explain with suitable ray diagrams. (or)

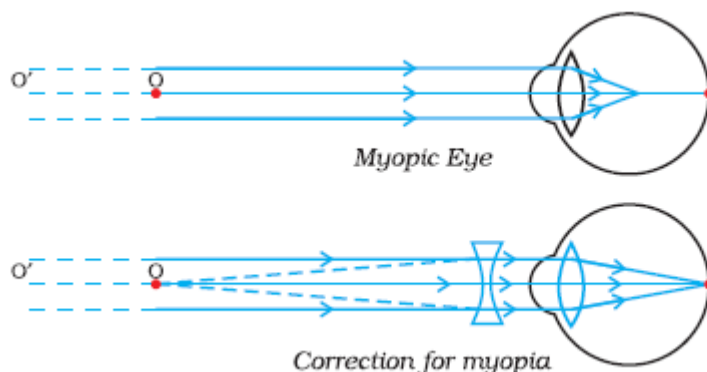
Explain, how do you correct the eye defect Myopia with a suitable diagram. (or)

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:

- Myopia is also known as nearsightedness.
- A person with myopia can see nearby objects clearly but cannot see distant objects distinctly.
- 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.
- In a myopic eye, the image of a distant object is formed in front of the retina and not at the retina itself.
- This defect may arise due to i) excessive curvature of the eye lens or ii) elongation of the eyeball.
- This defect can be corrected by using a concave lens of suitable power.
- 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)

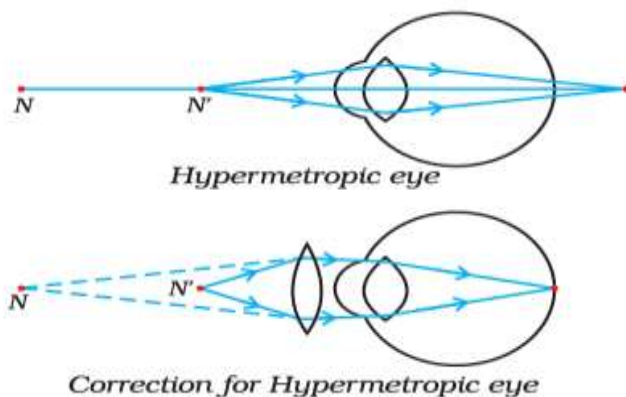
What is Hypermetropia? How do you correct the eye defect Hypermetropia? (or)

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. (or)

Kamala can see the distant objects clearly but can't see the nearby objects clearly, in which vision defect is suffering from? How can verify this defect? Explain with the help of suitable diagrams?

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.



3. Explain the following.

i) Twinkling of stars

Ans: i) Twinkling of stars

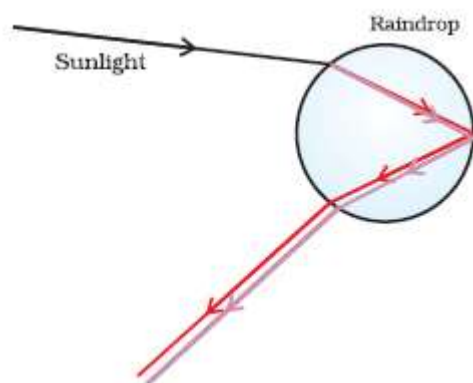
The twinkling of a star is due to atmospheric refraction of starlight. The starlight, on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth. The atmospheric refraction occurs in a medium of gradually changing refractive index.

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 dioptries.

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.

3. Metals and Non-metals

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

Section -1	1 Mark Questions	Q.No: 4	A/S/C
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1. Ramesh said that all metals are solids at room temperature. How would you gently guide him to reconsider his belief by asking a question?

Ans: Is mercury a metal that is liquid at room temperature?

2. A student believes that all metal oxides are basic in nature. Upon observing that aluminium oxide reacts with both acids and bases, what conclusion must be drawn by him about the nature of metal oxides?

Ans: Some metal oxides are amphoteric

3. Which metal is used for galvanizing iron?

Ans: Zinc

4. Bauxite is an ore of _____

Ans: Aluminium

5. Which metal is extracted by electrolysis?

A) Copper

B) Iron

C) Aluminium

D) Zinc

Ans: C) Aluminium

6. A student leaves an iron nail in water for several days. A reddish-brown layer forms on it. Name the process.

Ans: Rusting

7. Which metal is coated on iron during galvanization.

A) Copper

B) Zinc

C) Aluminium

D) Tin

Ans: B) Zinc

8. Which non-metal is a good conductor of electricity?

A) Sulphur

B) Graphite

C) Phosphorus

D) Bromine

Ans: B) Graphite

9. Which pair is correctly matched?

A) Galvanisation – Prevents rusting of iron

B) Roasting – Prevents corrosion

C) Alloying – Extracts aluminium

D) Calcination – Purifies gold

Ans: A) Galvanisation – Prevents rusting of iron

10. Why are copper and aluminium commonly used for electrical wiring instead of silver?

A) They conduct electricity better than silver

B) They are cheaper and good conductors

C) Silver is a poor conductor

D) Silver is a poor conductor

Ans: B) They are cheaper and good conductors

11. Name the hardest natural substance.

Ans: Diamond

12. Which metal is the best conductor of electricity?

Ans: Silver

13. Name the non-metal that exists as a liquid at room temperature.

Ans: Bromine

14. Which metals can be easily cut with knife?

Ans: Sodium and Potassium

15. _____ is the process of heating sulphide ores in the presence of air.

Ans: Roasting

16. Bauxite is an ore of _____.

Ans: Aluminium

17. Brass is an alloy of _____ and _____.

Ans: Copper and Zinc

18. Which ore contains mercury?

A) Bauxite

B) Cinnabar

C) Calamine

D) Haematite

Ans: B) Cinnabar

Ans: C) Aluminium

19. Which metal is used for making cooking utensils due to its corrosion resistance?

A) Sodium

B) Aluminium

C) Potassium

D) Calcium

Ans: B) Aluminium**20. A blacksmith heats iron before making agricultural tools. Which property of metals is used here?****Ans:** Malleability**21. Identify the incorrect statement.**

A) Graphite conducts electricity.

B) Mercury is a liquid metal.

C) Sodium is stored in water.

D) Gold is a noble metal.

Ans: C) Sodium is stored in water.**22. Name the metal which is in the liquid state.****Ans:** Mercury**23. Why is solder used for welding electrical wires?****Ans:** Joining electrical wires because it has a low melting point.**24. 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**25. Name two metals which are found in nature in the free state.****Ans:** Gold and Platinum**26. Formula of cinnabar is:**A) HgSO_4 B) HgS_2 C) HgS

D) None of these

Ans: C) HgS **27. Sudha believed all metals react with water. Which metal helps to correct this misconception?**

A) Sodium

B) Potassium

C) Gold

D) Calcium

Ans: C) Gold**28. Ravi thought all non-metals are poor conductors. Which non-metal proves this idea is not always true?**

A) Sulphur

B) Graphite

C) Bromine

D) Phosphorus

Ans: B) Graphite**29. Radha says iron can displace copper from copper sulphate solution, while Sudha says copper can displace iron from iron sulphate solution. Whose statement is correct?**

A) Radha only

B) Sudha only

C) Both

D) Neither

Ans: A) Radha only**30. Which of the following pairs will give displacement reactions?**A) NaCl solution and copper metalB) MgCl_2 solution and aluminium metalC) FeSO_4 solution and silver metalD) AgNO_3 solution and copper metal.**Ans:** D) AgNO_3 solution and copper metal.**31. 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.**32. 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**33. 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.**34. What type of oxides are formed when non-metals combine with oxygen?****Ans:** Acidic oxides**35. Which metals do not corrode easily?****Ans:** Gold, Platinum**36. Propose a method to extract a highly reactive metal from its ore?****Ans:** Electrolysis.**37. Why oxides of high reactive metals cannot be reduced by carbon.****Ans:** These metals have more affinity for oxygen than carbon.

38. What happens to silver articles when exposed to moist air?

Ans: They acquire a blackish tinge due to the formation of silver sulphide.

39. Why do ionic compounds have high melting points?

Ans: A considerable amount of energy is required to break the strong inter-ionic attraction.

40. Which one of the following is a non-metal?

A) Magnesium

B) Gold

C) Sulphur

D) Silver

Ans: C) Sulphur

Section -1V

8 Marks Questions

Q.No: 17 A

Awareness

1. Explain an activity to show that highly reactive metals displace less reactive metals from their compounds (or)

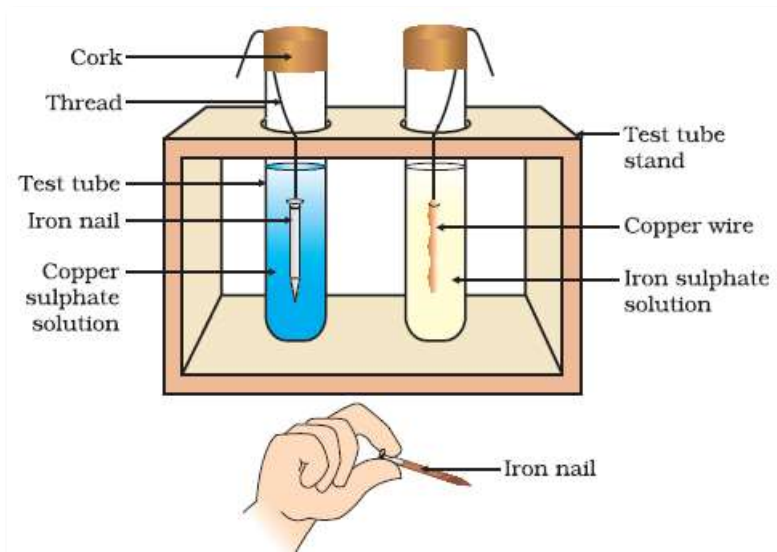
How do metals react with solutions of other metal salts? Describe an activity. (or)

Write an activity to show that high reactive metals displace 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 sulphate 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

2. Write an activity to show that metals are good conductors of heat. (or)

How to show that metals are good conductors of heat with help an activity. (or)

Explain the experimental procedure which proves that metals are good conductors of heat.

Ans:

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

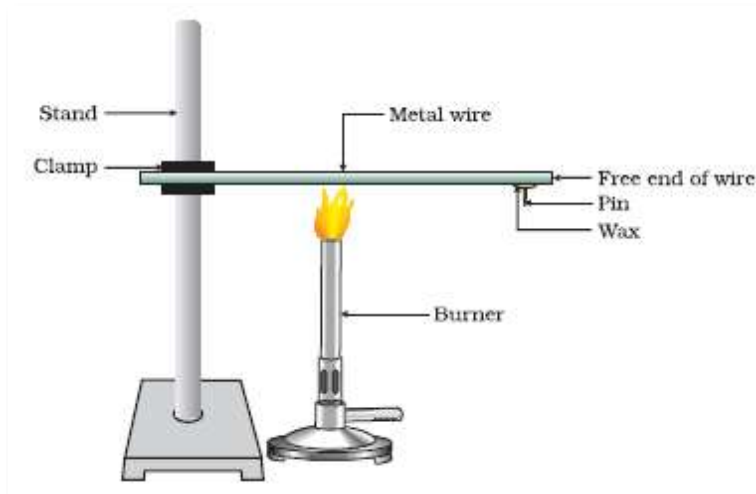
Required Materials: Copper/Aluminium wire, Stand, Clamp, Burner

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.

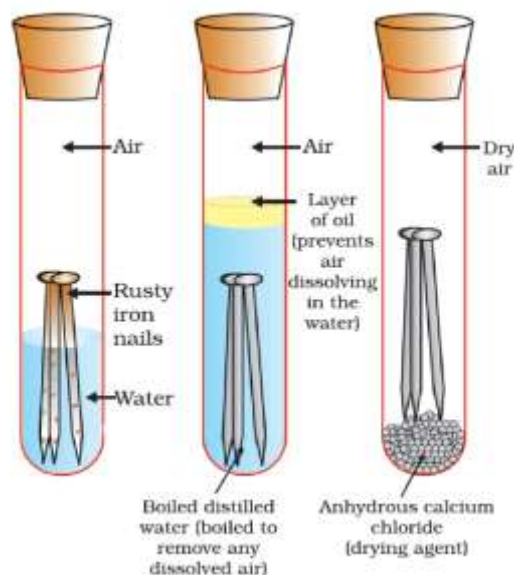
3. Explain the experimental procedure to investigate the conditions under which iron rusts. (or)

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

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.

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

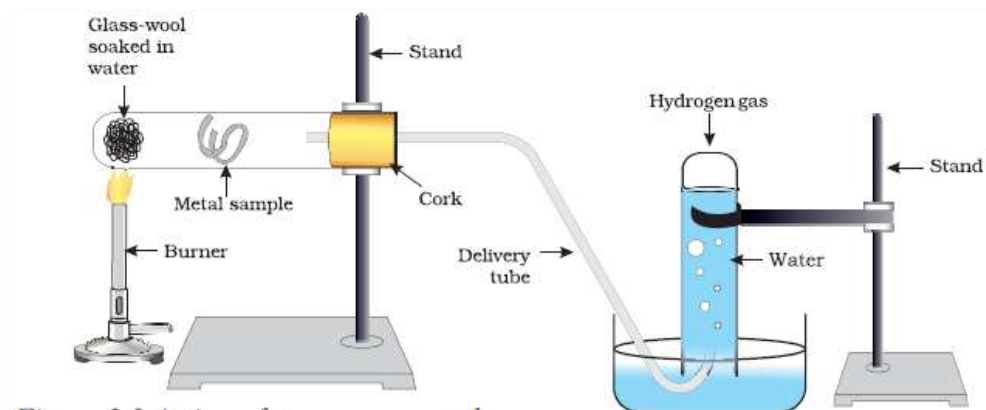
Ans:

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 $\text{Mg} < \text{Ca} < \text{Na} < \text{K}$
- 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.

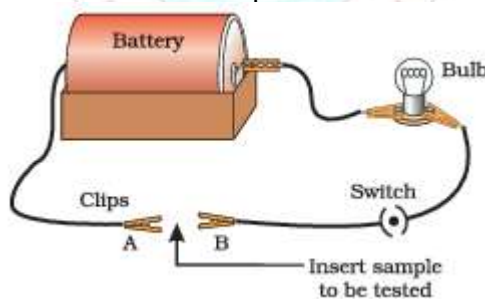
5. Conduct an activity to show that metals are good conductors of electricity.

Ans:

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

Required Materials: Battery, bulb, connecting wires, switch, clips and metal sample.

Procedure: i) Set up an electric circuit using a battery, bulb, switch and connecting wires as shown in the figure.
 ii) Place the metal sample between clips A and B.
 iii) Close the switch and observe the bulb.
 iv) Repeat the activity with different metal samples.



Observation: The bulb glows when a metal sample is placed between A and B. Metals are good conductors of electricity.

11. Electricity

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

Section -1	1 Mark Questions	Q.No: 8	A/S/C
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1. Why are alloys commonly used in electrical heating devices?

Ans: Alloys have high resistivity and high melting point.

2. Why are electric bulbs filled with Nitrogen and Argon gases?

Ans: To prevent oxidation of the tungsten filament.

3. A student connects two resistors in series to a battery and observes that the current in the circuit decreases. Explain the observation using Ohm's law.

Ans: In series, total resistance increases; hence current decreases.

4. During a laboratory experiment, Ramya observes that the current through a conductor increases in the same proportion as the potential difference. Which condition makes this observation valid?

- A) The conductor is heated continuously B) The temperature of the conductor remains constant
C) The length of the conductor is changed D) The conductor is replaced with another material

Ans: B) The temperature of the conductor remains constant

5. A circuit requires an equivalent resistance of less than $2\ \Omega$, but you have only two $3\ \Omega$ resistors. How would you connect them to meet the requirement?

Ans: Connect the two $3\ \Omega$ resistors in parallel.

6. Mohan suggests connecting all the appliances in a house in series, while Karuna insists they should be connected in parallel. Whose suggestion would you support?

Ans: Karuna's suggestion – appliances should be connected in parallel.

7. What is the S.I unit of resistivity?

- A) Ohm B) Ohm-metre C) Ohm/metre D) Ohm/m²

Ans: B) Ohm-metre

8. Why are electric bulbs filled with Nitrogen and Argon gases?

Ans: To prevent the oxidation and rapid evaporation of the tungsten filament, thereby increasing the life of the bulb.

9. A student connects two resistors in series to a battery and observes that the current in the circuit decreases. Explain this observation using Ohm's law.

Ans: In series, the total resistance increases ($R = R_1 + R_2$).

According to Ohm's law, $I = V/R$

For a constant voltage, when resistance increases, current decreases.

10. During a laboratory experiment, Reshma observes that the current through a conductor increases in the same proportion as the potential difference. Which condition makes this observation valid?

- A) The conductor is heated continuously. B) The temperature of the conductor remains constant.
C) The length of the conductor is changed. D) The conductor is replaced with another material.

Ans: B) The temperature of the conductor remains constant.

11. A circuit requires an equivalent resistance of less than $2\ \Omega$, but you have only two $3\ \Omega$ resistors. How would you connect them to meet the requirement?

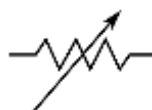
Ans: Parallel connection.

12. Ravi suggests connecting all the appliances in a house in series, while Meena insists they should be connected in parallel. Whose suggestion would you support? Why?

Ans: I support Meena's suggestion because appliances connected in parallel get the same potential difference and work independently.

13. Draw the symbol of Rheostat.

Ans:



14. Latha believes that increasing the length of a conductor is the only method to increase its resistance. What

question would you ask to encourage her to reconsider her idea using scientific evidence?

Ans: How can the resistance of a conductor be increased?

15. A student says, "If the voltage is doubled, the current will also double." Under what condition is this statement true?

Ans: The statement is true when the temperature and other physical conditions of the conductor remain constant.

16. Reshma said, "The current flowing through a conductor is directly proportional to the potential difference across it." What condition must be satisfied for this statement to be valid?

Ans: The temperature and other physical conditions of the conductor must remain constant for the statement to be valid.

17. What is the lowest total resistance possible with coils of 4 Ω , 8 Ω , 12 Ω ?

Ans: 1.71 Ω

18. Draw the symbol of a resistor of resistance.

Ans:



19. 2 Ω , 4 Ω resistors are connected in series. What will be the resultant resistance?

Ans: $R = R_1 + R_2 = 2 + 4 = 6 \Omega$

20. Two resistors 3 Ω , 6 Ω are connected in parallel. What will be the resultant resistance?

Ans: $R = \frac{R_1 \times R_2}{R_1 + R_2} = \frac{3 \times 6}{3 + 6} = \frac{18}{9} = 2 \Omega$

21. 1 KWH how many joules? (or) How many joules are there in one kilowatt hour?

Ans: $3.6 \times 10^6 \text{ J}$

22. 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

23. How is voltmeter connected in a circuit?

Ans: Parallel in a circuit

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

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

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

Ans: Tungsten

26. 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.

27. What will be the resistance of a new wire if the original wire of 4 Ω is made twice as thick?

Ans: The resistance of the new wire will be 1 Ω .

28. 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.

29. Express mathematically the potential difference.

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

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

Ans: $V = IR$

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

Ans: $P = VI$

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

Ans: The current through each resistor is same

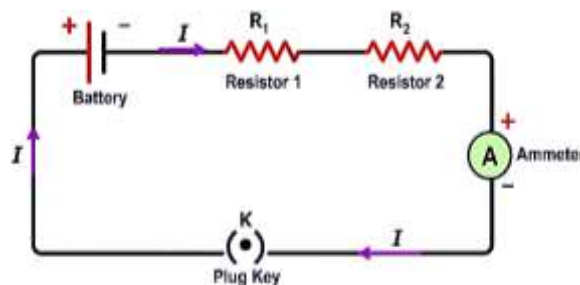
33. When do we say that the resistors are connected in parallel?

Ans: The potential difference across each resistor is same.

34. Which is having more resistance a 220 V, 100 W bulb or a 220 V, 60 W bulb?

Ans: 60 W bulb.

Ans:



2. A student while performing an experiment needs to regulate the current in a circuit without changing the battery. Suggest a suitable method to achieve this and justify your answer.

Ans: Connect a rheostat (variable resistor) in series. By changing its resistance, the current can be regulated without changing the battery.

3. A student has a long nichrome wire with high resistance but needs to reduce its resistance for an experiment. Suggest any two different changes that can be made to the wire or the circuit to reduce the resistance.

Ans: i) Reduce the length of the nichrome wire. ii) Connect another identical nichrome wire in parallel.

4. During the Ohm's law experiment, Abhi wants to keep the plug key closed continuously, while Susmitha suggests opening it after each observation. Whose suggestion would you support?

Ans: I support Sumitha's suggestion. The plug key should be opened after each observation to prevent heating of the resistor and change in resistance.

5. A student wants to reduce the resistance of a conducting wire. List any two changes that can be made to the wire to achieve this.

Ans: i) Decrease the length of the wire. ii) Increase its cross-sectional area (thickness).

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. A current of 0.5 A is drawn by the filament of an electric bulb for 10 minutes. Find the amount of electric charge that flows through the circuit.

Ans: $I = 0.5 \text{ A}$, $t = 10 \times 60 = 600 \text{ s}$
 $Q = It = 0.5 \times 600 = 300 \text{ C}$

8. How can resistors with resistances of 2 Ω , 3 Ω and 6 Ω be connected to give a total resistance of
 (a) 4 Ω (b) 1 Ω

Ans: a) Connect 3 Ω and 6 Ω in parallel, and then connect 2 Ω in series.
 b) Connect 2 Ω , 3 Ω and 6 Ω in parallel.

9. What is the minimum resistance that can be obtained 4 Ω , 8 Ω , 12 Ω the wires.

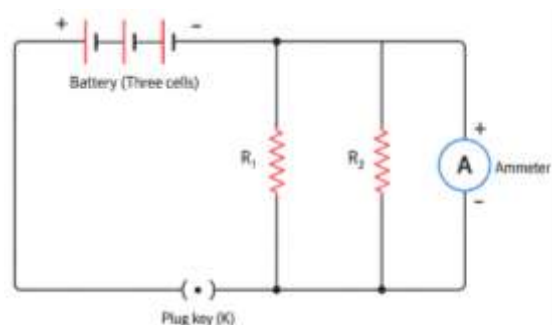
Ans: The minimum resistance is obtained by connecting 4 Ω , 8 Ω and 12 Ω in parallel.

$$1/R = 1/4 + 1/8 + 1/12 = 11/24$$

$$R \approx 24/11 = 2.18 \Omega$$

10. Design a circuit consisting of a battery with three cells, two resistors connected in parallel, a plug key, and an ammeter. Draw the circuit diagram using standard electrical symbols.

Ans:



11. A student wants to change the resistance of a conductor. List any two factors that affect the resistance of a conductor.

Ans: Length of the conductor and cross-sectional area of the conductor.

12. During an Ohm's law experiment, Amar wants to keep the plug key closed continuously, while Nandu

suggests opening it after each observation. Whose suggestion would you support? Give a scientific reason for your answer.

Ans: I support Nandu's suggestion. The plug key should be opened after each observation to prevent heating of the resistor, which may change its resistance.

13. To reduce electricity consumption, which should a family reduce first: using a 250 W TV for 1 hour or using a 1200 W grinder for 10 minutes? Justify your answer using the concept of electrical energy.

Ans: Energy consumed by TV is $E = 250 \times 1 = 250 \text{ Wh}$

Energy consumed by grinder is $E = 1200 \times 1060 = 200 \text{ Wh}$

Therefore, the family should reduce the use of the 250 W TV for 1 hour first.

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

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

15. 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.

16. 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 the components fails the circuit does not break and remaining components work.

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

17. List any two electrical appliances used in daily life that generate heat.

Ans: Electric iron and electric heater.

18. 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 work. So, the series arrangement is not used for domestic circuits.

19. 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 a conductor is directly proportional to its length and inversely proportional to the area of cross-section.

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

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

21. What happens to the resistance of a conductor if its length is doubled and area of cross-section is halved?

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

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

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

23. 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 has very high resistance. So more electrical energy is converted into heat energy, hence the 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.

24. 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.

Section -IV

8 Marks Questions

Q.No: 15 B

Awareness

1. 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'.

2. Derive the equation $R_s = R_1 + R_2 + R_3$ (or)

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

$$V_1 = IR_1$$

$$V_2 = IR_2 \quad ;$$

$$V_3 = IR_3$$

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

$$\text{Also } V = IR_s$$

$$V = V_1 + V_2 + V_3$$

$$IR_s = IR_1 + IR_2 + IR_3$$

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

$$R_s = R_1 + R_2 + R_3$$

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

3. 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.

$$\text{Also } I = V/R_p$$

$$I = I_1 + I_2 + I_3$$

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

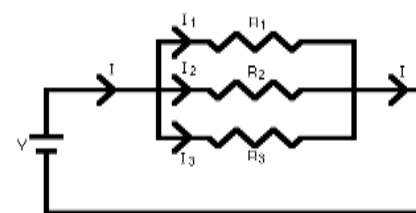
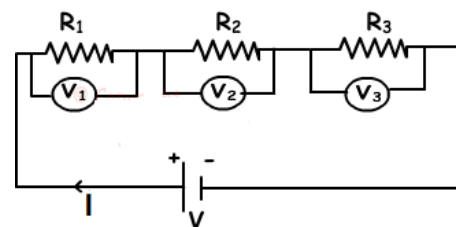
$$1/R_p = 1/R_1 + 1/R_2 + 1/R_3$$

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

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. $R = \rho l/A$	4. $\rho = RA/l$
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 $V = W/Q$

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

From (1) & (2)

$$W = VIt$$

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

$$H = VIt$$

Applying Ohm's law

$$H = I^2Rt$$

6. Explain the Factors Affecting Resistance

Ans: The resistance of a conductor depends mainly on the following factors:

- a) Length of the conductor (l):** Resistance is directly proportional to the length of the conductor.
A longer wire has more resistance than a shorter wire.
- b) Cross-sectional area (A):** Resistance is inversely proportional to the cross-sectional area of the conductor.
A thin wire has more resistance, while a thick wire has less resistance.
- c) Nature of the material:** Resistance depends on the material of the conductor.
Different materials have different resistivities.
- d) Temperature of the conductor:** The resistance of a metallic conductor generally increases with increase in temperature.



4. Carbon and its Compounds

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

Section -1	1 Mark Questions	Q.No: 5	A/S/C
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1. 5–8% solution of acetic acid is called _____.

Ans: Vinegar

2. Ethane with the molecular formula C_2H_6 has _____ covalent bonds.

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

Ans: B) 7

3. A student proposes to make a sweet-smelling compound from ethanol and acetic acid. Which reaction should be carried out?

Ans: Esterification reaction

4. Identify the alkene among the following hydrocarbons.

- A) C_2H_6 B) C_3H_8 C) C_2H_4 D) CH_4

Ans: C) C_2H_4

5. A hydrocarbon has four carbon atoms and six hydrogen atoms. Write it's name.

Ans: Butyne (C_4H_6)

6. Which of the following hydrocarbons undergoes addition reaction?

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

Ans: C) C_3H_6

7. Give any example of a saturated hydrocarbon?

Ans: Ethane (C_2H_6)

8. Write the formula of Methanoic acid?

Ans: $HCOOH$

9. Write the IUPAC name of CH_3-O-CH_3

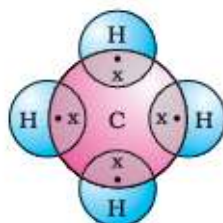
Ans: Methoxymethane

10. Why is conversion of ethanol to ethanoic acid considered an oxidation reaction?

Ans: Ethanol gains oxygen.

11. Draw the electron dot structure of methane.

Ans:



12. IUPAC name of CH_3CH_2OH is

- A) Methanol B) Ethanol C) Ethanal D) Ethanoic acid

Ans: B) Ethanol

13. Which belongs to the same homologous series?

- A) CH_4 and C_2H_4 B) C_2H_6 and C_3H_8 C) C_2H_2 and C_3H_8 B) CH_3OH and $HCHO$

Ans: B) C_2H_6 and C_3H_8

14. General formula of alkyl group is

- A) C_nH_{2n+2} B) C_nH_{2n} C) C_nH_{2n-2} D) C_nH_{2n+1}

Ans: D) C_nH_{2n+1}

15. Write the structural formula of any hydrocarbon with eight carbon atoms.

Ans: C_8H_{18} (or) $CH_3-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-CH_3$ (Octane)

16. Identify the functional group present in propanal.

Ans: Aldehyde functional group (or) $-CHO$

17. Which of the following undergoes substitution reaction?

A) CH₄B) C₃H₆C) C₂H₂D) C₈H₁₄

Ans: A) CH₄

18. The general formula of alkanes is C_nH_{2n+2}. Write the first member of alkanes.

Ans: CH₄

19. A hydrocarbon has four carbon atoms and ten hydrogen atoms. Write its name.

Ans: Butane

20. Which compound is formed when two carbon atoms are linked by a single bond and six hydrogen atoms are added?

Ans: Ethane (or) C₂H₆

21. How can you convert ethene into ethane?

Ans: By hydrogenation

22. Give any example of an unsaturated hydrocarbon.

Ans: Ethene (or) C₂H₄

23. How many hydrogen atoms are present in butane?

Ans: 10

24. Which type of bond is present between carbon atoms in ethene?

Ans: Double covalent bond

25. The property of carbon to form chains, branched chains and rings is called

A) Allotropy

B) Catenation

C) Isomerism

D) Tetravalency

Ans: B) Catenation

26. General formula of alkenes is

A) C_nH_{2n+2}B) C_nH_{2n}C) C_nH_{2n-2}D) C_nH_{2n+1}

Ans: B) C_nH_{2n}

27. Which of the following is not an allotrope of carbon?

A) Diamond

B) Graphite

C) Fullerene

D) Methane

Ans: D) Methane

28. Functional group present in CH₃COOH is

A) Alcohol

B) Aldehyde

C) Ketone

D) Carboxylic acid

Ans: D) Carboxylic acid

29. On adding sodium to ethanol, gas evolved is

A) H₂B) O₂C) CO₂D) CH₄

Ans: A) H₂

30. Why does carbon form covalent bonds only?

Ans: Carbon has four valence electrons. It cannot easily gain or lose four electrons. It completes its octet by sharing electrons and forming covalent bonds.

31. Name the catalyst used in hydrogenation of vegetable oils.

Ans: Nickel (or) Ni

32. Formula of Alcohol functional group is

A) – OH

B) – CHO

C) – CO –

D) – COOH

Ans: A) – OH

33. Formula of Carboxylic acid functional group is

A) – OH

B) – CHO

C) – CO –

D) – COOH

Ans: D) – COOH

34. Ethane, with the molecular formula C₂H₆ has

A) 6 covalent bonds

B) 7 covalent bonds

C) 8 covalent bonds

D) 9 covalent bonds

Ans: B) 7 covalent bonds

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

A) carboxylic acid

B) aldehyde

C) ketone

D) alcohol.

Ans: C) ketone

36. 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

37. What is the common name for ethanol?

Ans: Alcohol.

38. What is the common name for ethanoic acid?

Ans: Acetic acid

39. Write the formula of first member of the homologous series to which C₅H₆ belongs.

Ans: C₂H₄

40. 100% pure ethanol is called

A) Rectified spirit B) Absolute alcohol C) Denatured alcohol D) Power alcohol

Ans: B) Absolute alcohol

41. What are groups that confer specific properties to a compound called?

Ans: Functional groups

42. What is a series of compounds with the same functional group called?

Ans: A homologous series.

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

Ans: 3 structural isomers.

Section -1I	2 Marks Questions	Q.No: 9	Creativity
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1. Name all possible structural isomers of C₄H₁₀.

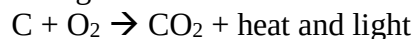
Ans: n-Butane and Isobutane (2-methylpropane).

2. Name any two allotropes of carbon.

Ans: Diamond and Graphite

3. 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.



4. What is allotropy? Write the allotropes of carbon.

Ans: Allotropy is the property of an element to exist in different forms in the same physical state.

Allotropes of carbon are diamond, graphite and fullerenes.

5. A student says ethanol and ethanoic acid have the same properties. Is the statement correct?

Ans: No. Ethanol and ethanoic acid have different functional groups and hence show different chemical properties.

6. Explain why carbon forms a large number of compounds. Give any two reasons.

Ans: Catenation and tetravalency.

7. Write two properties of ethanol related to its use as a fuel.

Ans: i) Ethanol is highly combustible. ii) It burns with a clean flame and produces considerable heat.

8. Draw the structure isomers of butane. Name them.

Ans: CH₃–CH₂–CH₂–CH₃

(n-Butane)

CH₃

|

CH₃–CH–CH₃

2-Methylpropane (or) Isobutane

9. What are the two properties of carbon that lead to the huge number of carbon compounds?

Ans: Catenation and tetravalency.

10. Name the following functional groups:

a) –CHO

b) > C=O

Ans: a) Aldehyde group

b) Ketone group

11. What are hydrocarbons? How are they classified?

Ans: Hydrocarbons contain carbon and hydrogen atoms.

1. Alkanes 2. Alkenes 3. Alkynes

12. Give two examples each of saturated and unsaturated hydrocarbons.

Ans: Saturated hydro carbon: CH₄

Unsaturated hydro carbon: C₂H₂

13. Give one example each of a carbon compound containing:

a) Alcohol functional group

b) Carboxylic acid functional group

Ans: a) Ethanol (C₂H₅OH) b) Ethanoic acid (CH₃COOH)

14. Why are cooking oils hydrogenated before making vanaspati ghee?

Ans: Cooking oils are hydrogenated to convert unsaturated oils into saturated solid fats (vanaspati ghee).

15. Suggest a way to identify whether a carbon compound is saturated or unsaturated.

Ans: Add bromine water to the compound. Decolourisation indicates an unsaturated compound; no colour change indicates a saturated compound.

16. Differentiate between saturated and unsaturated hydrocarbons with one example each.

Ans:

Saturated hydrocarbons	Unsaturated hydrocarbons
Contain only single bonds	Contain atleast one double or triple bonds
Ethane (C ₂ H ₆)	Ethene (C ₂ H ₄).

17. Why are carbon compounds poor conductors of electricity?

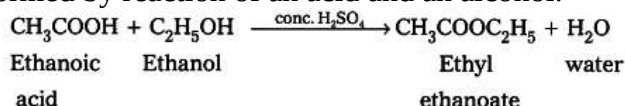
Ans: Carbon compounds are poor conductors of electricity because they generally do not form ions or have free electrons.

18. Why is a flame of unsaturated hydrocarbons smoky? How can we test for unsaturation?

Ans: Unsaturated hydrocarbons burn with a smoky flame due to incomplete combustion and higher carbon content. Unsaturation can be tested using bromine water; its decolourisation confirms unsaturation.

19. Write the chemical equation for esterification reaction. Name the ester formed from ethanol and ethanoic acid.

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



20. How is soap different from detergent? Give one point for each.

Ans: Soap forms scum and is less effective in hard water. Detergent works effectively in hard water and does not form scum.

21. What is meant by homologous series? Write two characteristics.

Ans: Series of compounds in which the same functional group substitutes for hydrogen in a carbon chain is called a homologous series. Example: CH₃OH, C₂H₅OH and C₃H₇OH.

The difference between the formulae of any two successive members is - CH₂.

22. 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.

23. Explain the nature of the covalent bond using the bond formation in CH₃Cl.

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

24. 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.

25. 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.

26. 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 -IV	8 Marks Questions	Q.No: 16 B	Awareness
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1. Complete the following table.

No. of carbon in Hydro carbon	Alkane	Alkene	Alkyne
3	C ₃ H ₈		
4		C ₄ H ₈	
5			C ₅ H ₈
6		C ₆ H ₁₂	

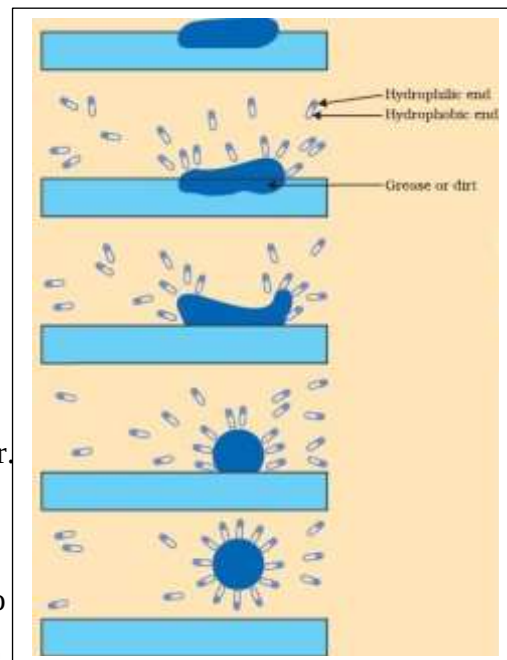
Ans:

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. Fill the table with suitable answers related to functional groups, structural formulae, examples and suffixes.

Structural formula	Functional group name	Suffix	Example
R-OH			C_2H_5OH
	Aldehyde		CH_3CHO
R-COOH	Oic Acid		
		-One	$CH_3-CO-CH_3$

Ans:

Structural formula	Functional group name	Suffix	Example
R-OH	Alcohol	-ol	C_2H_5OH
R-CHO	Aldehyde	-al	CH_3CHO
R-COOH	Carboxylic Acid	-oic acid	CH_3CH_2COOH
R-CO-R	Ketone	-One	$CH_3-CO-CH_3$

5. Complete the table of alkanes, alkenes and alkynes based on the number of carbon atoms.

Number of Carbons in Hydrocarbon	Alkanes	Alkenes	Alkynes
2			Ethyne
3		Propene	
4	Butane		
5			Pentyne

Ans:

Number of Carbons in Hydrocarbon	Alkanes	Alkenes	Alkynes
2	Ethane	Ethene	Ethyne
3	Propane	Propene	Propyne
4	Butane	Butene	Butyne
5	Pentane	Pentene	Pentyne

6. 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.

7. Differentiate between alkanes, alkenes, and alkynes

Ans:

Property	Alkanes	Alkenes	Alkynes
1. Nature	Saturated hydrocarbons	Unsaturated hydrocarbons	Unsaturated hydrocarbons
2. Bond between carbon atoms	Single bond (C–C)	At least one double bond (C=C)	At least one triple bond (C≡C)
3. General formula	C_nH_{2n+2}	C_nH_{2n}	C_nH_{2n-2}
4. Example	Ethane (C ₂ H ₆)	Ethene (C ₂ H ₄)	Ethyne (C ₂ H ₂)
5. Main reaction	Substitution reaction	Addition reaction	Addition reaction

8. Explain the following

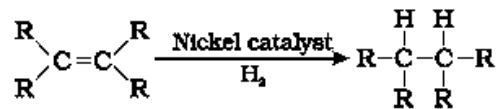
i) Addition reactions of unsaturated hydrocarbons

ii) Substitution reactions of saturated hydrocarbons

Ans: i) Addition reactions of unsaturated hydrocarbons

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

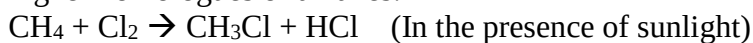
Addition reaction is commonly used in the hydrogenation of vegetable oils using a nickel catalyst.



ii) Substitution reactions of saturated hydrocarbons

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.



9. 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:

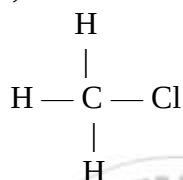
Ethanol	Ethanoic acid
It is a neutral compound	It is an acidic compound
It does not reaction with metal carbonates	It reacts with metal carbonates to form salt, water and carbon dioxide
It does not give Brisk effervescence	It gives Brisk effervescence
It is oxidized	It is not oxidized

10. Explain the nature of the covalent bond using the bond formation in CH₃Cl.

Ans: A covalent bond is formed by the sharing of electrons between atoms.

In CH₃Cl (chloromethane), carbon has 4 valence electrons, hydrogen has 1 valence electron, and chlorine has 7 valence electrons.

Carbon shares one electron each with three hydrogen atoms and one chlorine atom. Thus, carbon completes its octet, each hydrogen completes its duplet, and chlorine completes its octet.



Thus, CH₃Cl contains four single covalent bonds formed by sharing of electrons.



12. Magnetic Effects of Electric Current

Structure: 1(8 Marks) = 8 Marks

Section -1V

8 Marks Questions

Q.No: 17 A

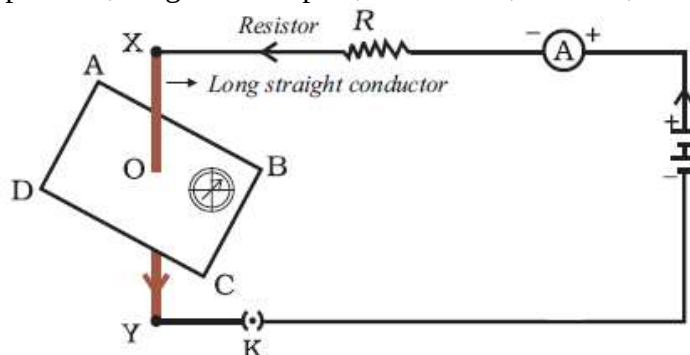
Awareness

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.

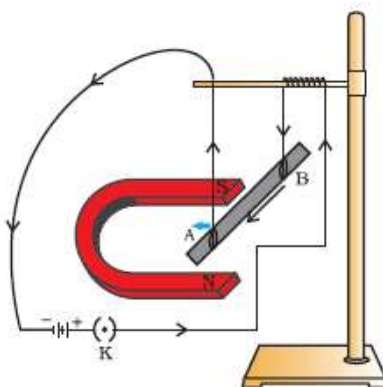
2. Write an activity to show that a current-carrying conductor experiences a force when placed in a magnetic field.

(or) 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.

3. 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:



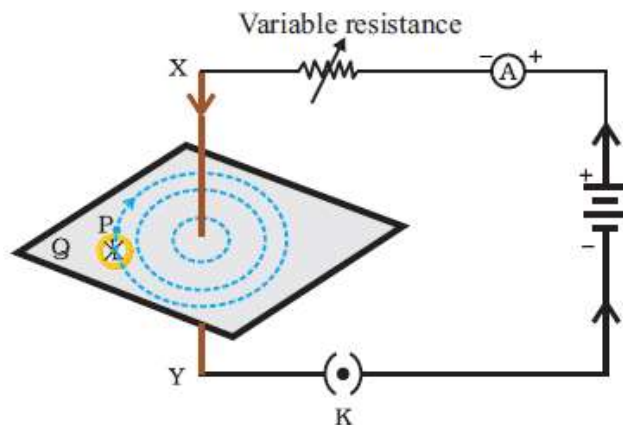
- 1) Take a small compass and a bar magnet.
- 2) Place the magnet on a sheet of white paper fixed on a drawing board, using some adhesive material.
- 3) Mark the boundary of the magnet. Place the compass near the north pole of the magnet.
- 4) The south pole of the needle points towards the north pole 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.

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.



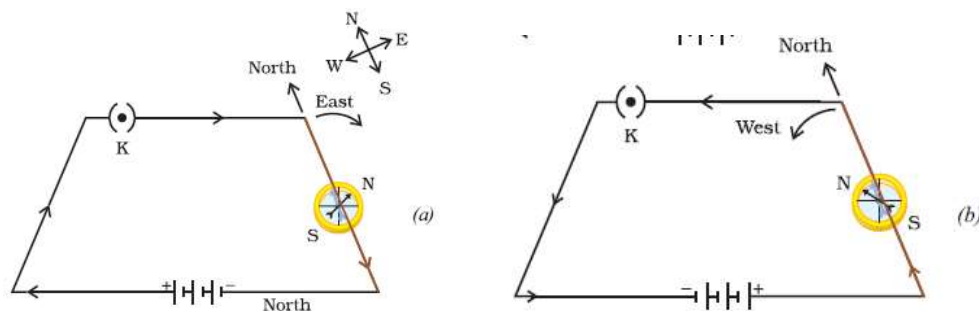
Procedure: 1. As shown in the figure, connecting the circuit.

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 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.



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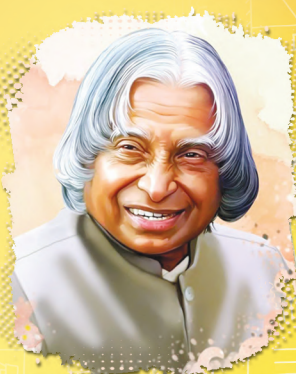


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