CHRIST KING HR. SEC. SCHOOL, KOHIMA
CLASS 10
SCIENCE (PHYSICS AND CHEMISTRY)

## FIRST TERM:

## CHAPTER-1 (CHEMICAL REACTIONS AND EQUATIONS)

## TEXTBOOK EXERCISES (Page number: 14-17)

**1. Which of the statements about the reaction below are incorrect?**

$2PbO(s) + C(s) \rightarrow 2Pb(s) + CO_2(g)$

**(a) Lead is getting reduced**

**(b) Carbon Dioxide is getting oxidised**

**(c) Carbon is getting oxidised**

**(d) Lead oxide is getting reduced**

**(i) (a) and (b)**

**(ii) (a) and (c)**

**(iii) (a), (b) and (c)**

**(iv) all**

**Ans:** (i) (a) and (b)

**2. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$**

**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.

**3. What happens when dilute hydrochloric acid is added to iron fillings? Tick the correct answer.**

**(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.

**4. What is a balanced chemical equation? Why should a chemical equation be balanced?**

**Ans:** A chemical equation which has equal number of atoms of each element in the reactants and products is called a balanced chemical equation. Balancing chemical equation is necessary for the reaction should obey the Law of Conservation of energy. Balancing the chemical equation has no defined method and is purely a trial and error attempt.

**5. Translate the following statements into chemical equations and balance them.**

**(a) Hydrogen gas combines with nitrogen to form ammonia.**

**(b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.**

**(c) Barium chloride reacts with aluminium sulphate to give Aluminium chloride and a precipitate of barium sulphate.**

**(d) Potassium metal reacts with water to give potassium hydroxide and Hydrogen gas.**

**Answers:** (a) $H_2 + N_2 \rightarrow NH_3$

Balanced equation: $3H_2 + N_2 \rightarrow 2NH_3$

(b) $H_2S + O_2 \rightarrow H_2O + SO_2$

Balanced equation: $2H_2S + 3O_2 \rightarrow 2H_2O + 2SO_2$

(c) $BaCl_2 + Al_2(SO_4)_3 \rightarrow AlCl_3 + BaSO_4$

Balanced equation: $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 2AlCl_3 + 3BaSO_4$

(d) $K + H_2O \rightarrow KOH + H_2$

Balanced equation: $2K + 2H_2O \rightarrow 2KOH + H_2$

**6. Balance the following chemical equations.**

**(a) $HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + H_2O$**

**(b) $NaOH + H_2SO_4 \rightarrow$ Na2SO4 + H2O**

**(c) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$**

**(d) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + HCl$**

**Anwers:**

(a) $2HNO_3 + 2Ca(OH)_2 \rightarrow 2Ca(NO_3)_2 + 2H_2O$

(b) $6NaOH + 3H_2SO_4 \rightarrow H_2SO_4 + 6H_2O$

(c) $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

(d) $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

**7. Write the balanced chemical equation for the following reactions.**

**(a)Calcium hydroxide + Carbon dioxide —-> Calcium carbonate + Water**

**(b) Zinc + Silver nitrate —-> Zinc nitrate + Silver**

**(c) Aluminium + Copper chloride —-> Aluminium chloride + Copper**

**(d) Barium chloride + Potassium sulphate —-> Barium sulphate + Potassium chloride**

**Answers:**

(a) $2Ca(OH)_2 + 2CO_2 \rightarrow 2CaCO_3 + 2H_2O$

(b) $Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$

(c) $2Al + 3CuCl_3 \rightarrow 2AlCl_3 + 3Cu$

(d) $BaCl_2 + K_2SO_4 \rightarrow BaSO_4 + 2KCl$

**8) Write a balanced chemical equation for the following and identify the type of reaction of each case**

**(a) Potassium bromide (aq) + Barium iodide (aq) →Potassium iodide (aq) + Barium bromide (s)**

**(b)Zinc carbonates (s) → Zinc oxide (s) + Carbondioxide (g)**

**(c) Hydrogen (g) + Chlorine (g) → Hydrogen Chloride (g)**

**(d)Magnesium (s) + HydroChloric acid (aq) → Magnesium Chloride (aq) + Hydrogen(g )**

**Answers:**

(A) $2KBr + BaI_2 \rightarrow 2KI + BaBr_2$ (Double Displacement Reaction)

(b) $ZnCO_3 \rightarrow ZnO + CO_2$ (Decomposition Reaction)

(c) $H_2 + Cl \rightarrow 2HCl$ (Combination Reaction)

(d) $Mg + 2HCl \rightarrow MgCl_2 + H2$ (Displacement Reaction)

**9) What is meant by exothermic and endothermic reactions? Give examples.**

**Ans:**

The chemical reactions which occur with the evolution of heat are called exothermic reactions. Example: Explosions, concrete setting, nuclear fission and fusion.

The chemical reactions which occur with the absorption of heat are called endothermic reactions. Example: Photosynthesis, melting of ice, evaporation.

**10. Why is combustion reaction an oxidation reaction?**

**Ans: Oxidation reaction is a reaction which involves the addition of oxygen. In a combustion reaction, oxygen is combined with the fuel source usually carbon and hydrogen based resulting in carbon dioxide and water. So, this is an oxidation reaction.**

**11.(i) What happens when copper is heated in air?**

**(ii)What happens when the product obtained in above reaction is heated in hydrogen?**

**Answers: (i) 2Cu** + $O_2 \rightarrow$ 2CuO

(ii) CuO + $H_2 \rightarrow$ Cu + $H_2O$

12. An aluminium can was used to store ferrous sulphate solution. It is observed that, in few days holes appeared in the can. Explain the reason and write the chemical equation to support your answer.

Ans: Reactivity of aluminium is far more than iron. Because of this, aluminium displaces iron from its sulphate solution and made aluminium sulphate. Due to this reason, holes are appeared in the can.

2Al +3$FeSO_4 \rightarrow Al_2 (SO_4)_3$ + 3Fe

13. A metal ‘P’ when exposed to the moist air for longer period of time, loses its shiny brown surface and gains a green coat. Why this happened? Identify the metal. Write the name and chemical formula of this green coloured compound. List any two ways to prevent this process.

Ans: The metal ‘P’ has corroded because of being exposed to the moist air.

The metal is copper. The green coloured compound is basic Copper carbonate, $Cu\ CO_3 . Cu\ (OH)_2$

Two ways to prevent this process are:

(i) Coating the surface of metal with a thin layer of paint.

(ii) Coating the surface of metal with oil or grease.

14. Can oxidation or reduction take place alone? Why or why not? What are such reactions called?

Ans: Oxidation and reduction cannot occur alone. If one occurs, the other must occur also.

The reactions which involve oxidation and reduction are called redox reaction.

15. **Why is respiration considered to be an exothermic reaction?** Explain.

**Ans:** During respiration, we need energy. We obtain this energy from the food we eat. The food molecules, through the process of digestion, are broken down into a simpler molecule like glucose. These substances come in contact with the Oxygen present in our body cells to form Carbon dioxide and water along with a certain amount of energy. Since the energy is in the form of heat (that maintains our body temperature) the respiration is considered to be an exothermic reaction. The reaction taking place is:

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy

**16. Why are decomposition reactions called the opposite of Combination reactions? Write equations for these reactions.**

**Ans:** Combination reaction is said to be the reaction between two or more molecules to form a larger molecule; whereas the decomposition reaction is defined as the splitting of larger molecules into two or more smaller molecules. Thus, the decomposition reaction is the opposite of the combination reaction.

The decomposition reactions are:

$ZnCO_3 \rightarrow ZnO + CO_2$

$CaCO_3$ + Energy $\rightarrow CaO + CO_2$

The combination reactions are:

$2H_2$ (g) + $O_2 \rightarrow 2H_2O$ (l)

$NH_3$ (g)+ HCl (g) $\rightarrow NH_4$ Cl(s)

**17. Write one equation each for decomposition reactions in which energy is supplied in the form of heat, light or electricity.**

**Ans:**

(a) Thermal decomposition reaction (Thermolysis)

$2KClO_3$ + Heat $\rightarrow 2KCl + 3O_2$

(b) Electrolytic decomposition reaction (Electrolysis)

$$2NaCl \xrightarrow{electricity} 2Na + Cl_2$$

(c) Photodecomposition reaction (Photolysis)

$$2H_2O_2 \xrightarrow{light} 2H_2O$$

**18. What is the difference between displacement and double displacement reactions? Write equations for these reactions.**

**Ans:** A displacement reaction is the one when a more reactive substance displaces a less reactive one from its salt solution whereas a double displacement reaction is the one where a mutual exchange of ions happens between two compounds.

In a displacement reaction, only a single displacement takes place.

In the double displacement reaction, two displacement takes place between the molecules.

Examples:

Displacement reaction:

$Mg + 2HCl \rightarrow MgCl_2 + H_2$

Double displacement reaction:

$2KBr + BaI_2 \rightarrow 2KI + BaBr_2$

**19. In the refining of Silver, the recovery of silver from Silver nitrate solution involves displacement reaction by Copper metal. Write down the reaction involved.**

**Ans:**

$Cu(s) + 2AgNO_3(aq) \rightarrow Cu(NO_3)_2(aq) + 2Ag(s)$

**20. What do you mean by a precipitation reaction? Explain by giving examples.**

**Ans:** The reactions in which precipitates are produced are called precipitation reaction. Few examples of precipitation reactions are:

$2AgNO_3(s) + BaCl_2(aq) \rightarrow 2AgCl(s) + Ba(NO_3)_2(aq)$

$2NaOH\ (aq) + MgCl_2\ (aq) \rightarrow 2NaCl\ (aq) + Mg\ (OH)_2(s)$

**21. Explain the following in terms of gain of oxygen with two examples each.**

**(a) Oxidation**

**(b) Reduction**

**Ans:** (a) Oxidation is a reaction which involves addition or gain of oxygen.
Example: $4Na(s) + O_2 (g) \rightarrow 2Na2O(s)$

$H_2S + O_2 \rightarrow H_2O + SO_2$

(b) Reduction is a reaction which involves loss or removal of oxygen.
Example: $CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(l)$

$2HgO \rightarrow 2Hg + O_2$

**22. A shiny brown coloured element 'X' on heating in the air becomes black in colour. Name the element 'X' and the black coloured compound formed.**

**Ans:** The shiny brown coloured element **'X'** is Copper metal (Cu).

The black coloured compound formed is of copper oxide.

**23. Why do we apply paint on iron articles?**

**Ans:** Iron articles are painted to prevent them from rusting. When left unpainted, the metal surface comes in contact with the atmospheric oxygen and in the presence of moisture it from Iron (III) oxide. But if painted the surface does not come in contact with moisture and air thus preventing rusting.

**24. Oil and Fat containing food items are flushed with Nitrogen. Why?**

**Ans:** The main purpose of flushing Nitrogen into food packets that contain oil and fat items is to prevent rancidity which occurs when the oil or fat reacts with the oxygen letting out an unpleasant smell and taste. Therefore by flushing Nitrogen, an uncreative surrounding is created thus preventing rancidity.

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

**(a) Corrosion**

**(b) Rancidity**

**Ans:** (a) Corrosion is a process where a refined metal is oxidised by atmospheric oxygen to form a more stable compound such as oxides. The metal gradually degrades during the corrosion process. Rusting of iron is a good example of corrosion where the iron is converted to Iron oxide. Millions of dollars are spent annually in preventing rusting from bridges and other monuments.

(b) The condition produced by the aerial oxidation of the oil and fat present in the food material that produces an unpleasant taste and smell. The rancidity is retarded when the food is kept inside the refrigerator since the low temperature does not promote the oxidation reaction.

**Tick the correct option:**

1. (c) 2. (b) 3. (a) 4. (c) 5. (c)

In-text questions page-6

1. Ans: Magnesium ribbon is cleaned before burning so that the layer of layer of magnesium oxide can be removed and it becomes pure magnesium.

2. Ans: (i) $H_2 + Cl_2 \rightarrow 2HCl$

(ii) $3BaCl_2 + Al_2(SO_4)_3 \rightarrow 3BaSO_4 + 2AlCl_3$

(iii) $2Na + 2H_2O \rightarrow 2NaOH + H_2$

3. Ans : (i) $BaCl_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$

(ii) $NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$

In-text questions page-10

1. Ans: (i) Calcium oxide or Quick lime, CaO

(ii) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$

2. Ans: For 2 vol. of $H_2O$, 2 vol. of $H_2$ and 1 vol. of $O_2$ are produced. Therefore, the amount of hydrogen gas collected in the test tube is double of the amount of oxygen collected in other test tube.

In-text questions page-13

1. Ans: Iron displaces copper ions from the copper sulphate solution.Therefore, colour of the solution fades.

$CuSO_4(aq) + Fe(s) \rightarrow Cu(s) + FeSO_4$

2. Ans: $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3$

3. Answers: (i) Here, sodium is oxidized and $O_2$ is reduced.

(ii) Here, $H_2$ is oxidized and CuO is reduced.

**CHAPTER-3 (METALS AND NON-METALS)**

**TEXTBOOK EXERCISES (Page number: 58- 60)**

**1. Which of the following pairs will give displacement reactions?**

**(a) NaCl solution and copper metal**

**(b) $MgCl_2$ solution and aluminium metal**

**(c) $FeSO_4$ solution and silver metal**

**(d) $AgNO_3$ solution and copper metal**

**Ans: (** d) $AgNO_3$ solution and copper metal.

**2. Which of the following methods is suitable for preventing an iron frying pan from rusting?**

1. **Applying grease**
2. **Applying paint**
3. **Applying a coating of zinc**
4. **All of the above**

**Ans:** (c) Applying a coating of Zinc

**3. 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.

**4. 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** .

**5. You are given a hammer, a battery, a bulb, wires and a switch.**

**(a) How could you use them to distinguish between samples of metals and non-metals?**

**(b) Assess the usefulness of these tests in distinguishing between metals and non-metals.**

**Ans:**

(a)Metals are malleable and can be easily drown into sheets by hitting with hammer. Non-metals cannot be drawn into sheets as they are non-malleable. Metals are good conductors of electricity while non-metals are bad conductors of electricity.

(b)By making an electrical circuit, it can be tested for the electrical conductance of metals and non-metals.

**6. What are amphoteric oxides? Give two examples of amphoteric oxides**

**Ans: Metal o**xides which react with both acids and bases to produce salts and water are known as amphoteric oxides. Examples: ZnO, and $Al_2O_3$.

**7. Name two metals which will displace hydrogen from dilute acids and two metals which will not.**

**Ans:** Zinc (Zn) and Magnesium (Mg) are the two metals which will displace Hydrogen from dilute acids as they are very reactive metals.

Gold (Au) and Silver (Ag) are the metals which will not replace Hydrogen from dilute acids as these metals are less reactive.

**8. In the electrolytic refining of a metal M, what would you take as the anode, the cathode and the electrolyte?**

**Ans:** In the process of electrolytic refining of metal called 'M', An impure and thick block of metal M. is considered as anode, Thin strip or wire of pure metal M is taken as anode. A suitable metal salt solution of M is considered as the electrolyte.

**9. Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test tube over it, as shown in figure below.**

**(a) What will be the action of gas on?**

**(i) Dry litmus paper?**

**(ii) Moist litmus paper?**

**(b) Write a balanced chemical equation for the reaction taking place.**

**Ans: a) Gas evolved is** sulphur-di-oxide.

(i) No action with dry litmus paper.

(ii) It will turn the moist blue litmus paper to red.

**(b)** $S(s) + O_2(g) \rightarrow SO_2(g)$

$SO_2(g) + H_2O \rightarrow H_2SO_3$

**10. State two ways to prevent the rusting of iron.**

**Ans:**

1. By galvanization in which the surface of iron articles are covered with Zinc.
2. By applying Oil/grease on the surface of iron objects as it will prevent the iron surface to get in contact with air consisting of moisture.

**11. What happens to potassium and sodium if they are kept in open? Why they are immersed in kerosene?**

**Ans: If Potassium and sodium are kept in open, they react vigorously with oxygen and moisture present in air and catch fire .To prevent them and to protect from accidental fires, they are kept immersed in kerosene oil.**

**12. (a) Sodium is a highly reactive metal and it cannot be obtained from its oxide by heating with carbon. Give reason.**

**(b)How can sodium be obtained from sodium chloride?**

**Answers: (a) It is because of their high affinity with oxygen.**

**(b)Sodium can be obtained from sodium chloride by electrolytic reduction. During electrolysis, sodium is deposited at cathode while chlorine is liberated at anode.**

**13. A metal 'E' is stored under kerosene oil. When a small piece of it is left open in the air, it catches fire. When the product formed is dissolved in water it turns red litmus blue.**

**(i) Name the metal E.**

**(ii)Write the chemical equation for the reaction when it is exposed to air and when the product is dissolved in water.**

**(iii) Explain the process by which the metal is obtained from its molten chloride.**

**Answers: (i) Metal E is sodium.**

**(ii)** $4Na + O_2 \rightarrow 2Na_2O$

$Na_2O + H_2O \rightarrow 2NaOH$

(iii)The metal is obtained by electrolysis of molten metal chloride NaCl.

At cathode: $Na^+ + e^- \rightarrow Na$

Na is deposited

At anode: $2Cl^- \rightarrow Cl_2 + 2e^-$

$Cl_2$ is liberated

14. Most metal oxides are insoluble in water but some of these dissolve in water. What are these oxides and their solution in water called?

Ans: These oxides are potassium oxide and sodium oxide.

Their solution in water is called alkalis.

15. How metals can be differentiated from non-metals on the basis of any three chemical properties?

Ans:

| Metals | Non-metals |
|---|---|
| **(i)They are good conductors of heat and electricity.** | **(i) They are poor conductor of heat and electricity.** |
| **(ii)They are malleable and ductile.** | **(ii) They are not malleable and ductile.** |
| **(iii)They form an alloy with other metals or non-metals.** | **(iii)They do not form alloys.** |

**16. Give reason:**

**(a) Why do aluminium sheets not corrode easily?**

**(b) Why is copper vessel covered with a green coating in rainy season?**

**Answers: (a) It is because the surface of aluminium is protected by a natural layer of aluminium oxide. This prevents the metal from coming into contact with air and oxygen.**

**(b) When copper vessel is exposed to air in rainy season, the metal starts reacting with gases and moisture present in the atmosphere to form a mixture of copper carbonate and copper hydroxide. This gives a green colour to the surface of copper metal.**

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

**Ans:** When non-metals combine with oxygen it forms either acidic or neutral oxides.

Ex: $N_2O_5$ or $N_2O_3$ is an acidic oxide; CO is a neutral oxide.

**18. Give reasons**

**(a) Platinum, gold and silver are used to make jewellery.**

**(b) Sodium, potassium and lithium are stored under oil.**

**(c) Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.**

**(d) Carbonate and sulphide ores are usually converted into oxides during the process of extraction.**

**Answers:**

(a)Because platinum, gold and silver are very lustrous, less reactive and do not corrode easily.

(b)Because sodium, potassium and lithium are very reactive metals and react vigorously with air and water.

(c) Because aluminium is light in weight, good conductor of heat and resistant to corrosion.

(d) Because metals can be easily extracted from their oxides rather than from their carbonates and sulphides.

**19. You must have seen tarnished copper vessels being cleaned with lemon or tamarind juice. Explain why these sour substances are effective in cleaning the vessels.**

**Ans:** Tarnished copper vessels are coated with basic copper carbonate. Therefore, these are neutralised by acidic lemon or tamarind.

**20. Differentiate between metal and non-metal on the basis of their chemical properties.**

**Ans:**

| Metals | Non-metals |
|---|---|
| (i) When metals are heated with oxygen, they form ionic oxides which are basic in nature and form bases on dissolving with water. | (i) When non-Metals are heated with oxygen, they form covalent oxides which are acidic in nature which form acid on dissolving with water. |
| (ii) They are electro positive, lose electrons readily and become a positive ion. | (ii)They are electro negative, gain electrons and become negative ions. |
| (iii) All metals are solids except mercury. | (iii) Non-metals are in solid-liquid and gaseous states. |

**21. A man went door to door posing as a goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular**

**solution. The bangles sparkled like new but their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat. Can you play the detective to find out the nature of the solution he had used?**

**Ans: He** used Aqua regia which is the mixture of concentrated Hydrochloric acid and concentrated nitric acid in the ratio of 3:1. When gold ornament is dipped in this solution, a considerable amount of gold dissolves and hence its weight is reduced. The dishonest man may recover dissolved gold from aqua regia by a suitable treatment.

**22. Give reasons why copper is used to make hot water tanks and not steel (an alloy of iron).**

**Ans: B**ecause copper does not react with cold water, hot water or steam whereas iron reacts vigorously with steam to corrode the tank.

**Tick the correct option:**

1. (b) 2. (b) 3. (a) 4. (b) 5. (a) 6. (d)

In-text questions page-42

**1. Answers:**

(i) Mercury is the metal which is liquid at room temperature

(ii) Sodium and potassium are the metals which can be cut with a knife

(iii) Silver is the best conductor of heat

(iv) Lead is poor conductor of heat.

**2. Ans:** Metals which can be beaten to sheets are said to be malleable.

Metals which can be drawn into thin wires are said to be ductile.

In-text questions page-48

**1. Ans:** Sodium is very reactive. If it is kept open, it will react with oxygen to explore and catch fire. Therefore, sodium is kept immersed in kerosene oil to prevent its reaction with oxygen or air.

**2. Ans: (i)** $3Fe(s) + 4H_2O(g) \rightarrow Fe_3O_4(s) + 4H_2(g)$

**(ii)** $Ca(s) + 2H_2O(l) \rightarrow Ca(OH)_2(aq) + H_2(g)$

$2K(s) + 2H_2O(l) \rightarrow 2KOH(aq) + 2H_2(g)$

**3. Ans:** (i) Metal B is the most reactive metal.

(ii) When metal B is added to copper (II) sulphate solution, a

displacement reaction will take place because of which the blue colour of copper (II) sulphate solution will fade and a red-brown deposit of copper will be formed on metal B.

(iii)Metal B is the most reactive because it displaces iron from its salt solution. Metal A is less reactive because it displaces copper from its salt solution. Metal C is still less reactive because it can displace only silver from its salt solution and metal D is the least reactive because it cannot displace any metal from its salt solution. Hence, the decreasing order of reactivity of the metals is B > A > C > D.

**4. Ans:** Hydrogen gas is producd when dilute HCl is added to a reactive metal.

$$Fe(s) + H_2SO_4(aq) \rightarrow FeSO_4(aq) + H_2(g)$$

**5. Ans:** Zinc is more reactive (more electro positive) than iron. Therefore Zinc displaces Iron from its salt solution. The colour of ferrous sulphate is pale green, which turns colourless.

$$FeSO_4 + Zn \rightarrow ZnSO_4 + Fe_{(s)}$$

Light green  Zinc sulphate(Colourless)

In-text questions page-51

**1. Answers: (i) Sodium:**


**Oxygen:**

**Magnesium:**

**(ii) Formation of Magnesium oxide:**

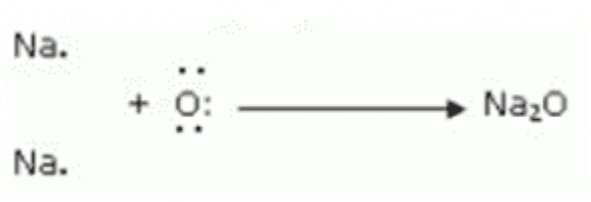
When magnesium reacts with oxygen, the magnesium atom transfers its two outermost electrons to an oxygen atom. By losing two electrons, the magnesium atoms form a magnesium ion ($Mg^{2+}$) and by gaining two electrons, the oxygen atom forms an oxide ion ($O^{2-}$).

Mg: +

→ MgO

**Formation of Sodium oxide:**

Two sodium atoms transfer their 2 outermost electrons to an oxygen atom. By losing two electrons, the two sodium atoms form tow sodium ions ($2Na^+$). And by gaining two electrons, the oxygen atom forms an oxide ion ($O^{2-}$).




**(iii)** The ions present in sodium oxide compound ($Na_2O$) are sodium ions ($2Na^+$) and oxide ions ($O^{2-}$).

The ions present in Magnesium oxide compound (MgO) are magnesium ions $Mg^{2+}$ and oxide ions ($O^{2-}$).

**2. Ans:** This is because a considerable amount of energy is required to break the strong inter-ionic attractions between the ions.

In-text questions page-55

**1. Answers:** (i) The elements or compounds which occur naturally in the earth's crust are known as minerals.

(ii) Ores are minerals from which metal can be profitably extracted

Ex: Bauxite ($Al_2O_3.2H_2O$) is the ore of Al.

(iii) The impurities of earth and rocks present with the ore are called gangue.

**2. Ans:** Gold and platinum.

**3. Ans:** Reduction process is used for obtaining a metal from its oxide.

Ex: Lead oxide is reduced to lead by heating with carbon

$PbO + C \rightarrow Pb + CO$

In-text questions page-57

**1. Answers:**

| Metal | Zinc | Magnesium | Copper |
|---|---|---|---|
| Zinc Oxide | – | Displacement | – |
| Magnesium Oxide | – | – | – |
| Copper Oxide | Displacement | Displacement | – |

**2. Ans:** Most unreactive metals do not corrode easily.

**3. Ans:** An alloy is a homogeneous mixture of two or more metals, or a metal and a non-metal.

## CHAPTER-10 (LIGHT- REFLECTION AND REFRACTION)

### TEXTBOOK EXERCISES (Page number: 194- 196)

**1. Which one of the following materials cannot be used to make a lens?**

**(a) Water**

**(b) Glass**

**(c) Plastic**

**(d) Clay**

**Ans:**(d) Clay

**2. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should be the position of the object?**

**(a) Between the principal focus and the centre of curvature**

**(b) At the centre of curvature**

**(c) Beyond the centre of curvature**

**(d) Between the pole of the mirror and its principal focus.**

**Ans:**(d) between the pole of the mirror and its principal focus.

**3. Where should an object be placed in front of a convex lens to get a real image of the size of the object?**

**(a) At the principal focus of the lens**

**(b) At twice the focal length**

**(c) At infinity**

**(d) Between the optical centre of the lens and its principal focus.**

**Ans:** (b) at twice the focal length

**4. A spherical mirror and a thin spherical lens has a focal length of -15 cm. The mirror and the lens are likely to be**

**(a) both concave**

**(b) both convex**

**(c) the mirror is concave and the lens is convex**

**(d) the mirror is convex, but the lens is concave**

**Ans:** (a) Both  concave.

**5. No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be**

**(a) plane**

**(b) concave**

**(c) convex**

**(d) either plane or convex**

**Ans:** (d) either plane or convex

**6. Which of the following lenses would you prefer to use while reading small letters found in a dictionary?**

**(a) A convex lens of focal length 50 cm**

**(b) A concave lens of focal length 50 cm**

**(c) A convex lens of focal length 5 cm**

**(d) A concave lens of focal length 5 cm**

**Ans:** (c) A convex lens of focal length 5 cm

**7. We wish to obtain an erect image of an object, using a concave mirror of focal length 15 cm. What should be the range of distance of the object from the mirror? What is the nature of the image? Is the image larger or smaller than the object?**

**Ans:** Range of the distance of the object = 0 to 15 cm.

Nature of the image = virtual, erect, and larger than the object.

**8. Name the type of mirror used in the following situations.**

**(a) Headlights of a car**

**(b) Side/rear-view mirror of a vehicle**

**(c) Solar furnace**

**Support your answer with reason.**

**Ans:** (a) Concave mirror: Because concave mirrors can produce powerful parallel beam of light when light source is placed at their principal focus.

(b) Convex mirror: Because of its largest field of view.

(c) Concave mirror: Because of its converging power.

**9. 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 experimentally. Explain your observations.**

**Ans:** Yes, it will produce a complete image of the object, as shown in figure. This can be verified experimentally by observing the image of a distance object like tree on a screen, when lower half of the lens is covered with a black paper. However, the intensity or brightness of image will reduce.


10. Explain why we see the sign in front of the some vehicles.

Ans: Ambulance is written backwards on the front of some vehicles so that

drivers ahead can read easily the word from their rear view mirrors.

11. What is meant by power of a lens? Give its SI unit. When two or more lenses are placed in contact, what will be their combined power?

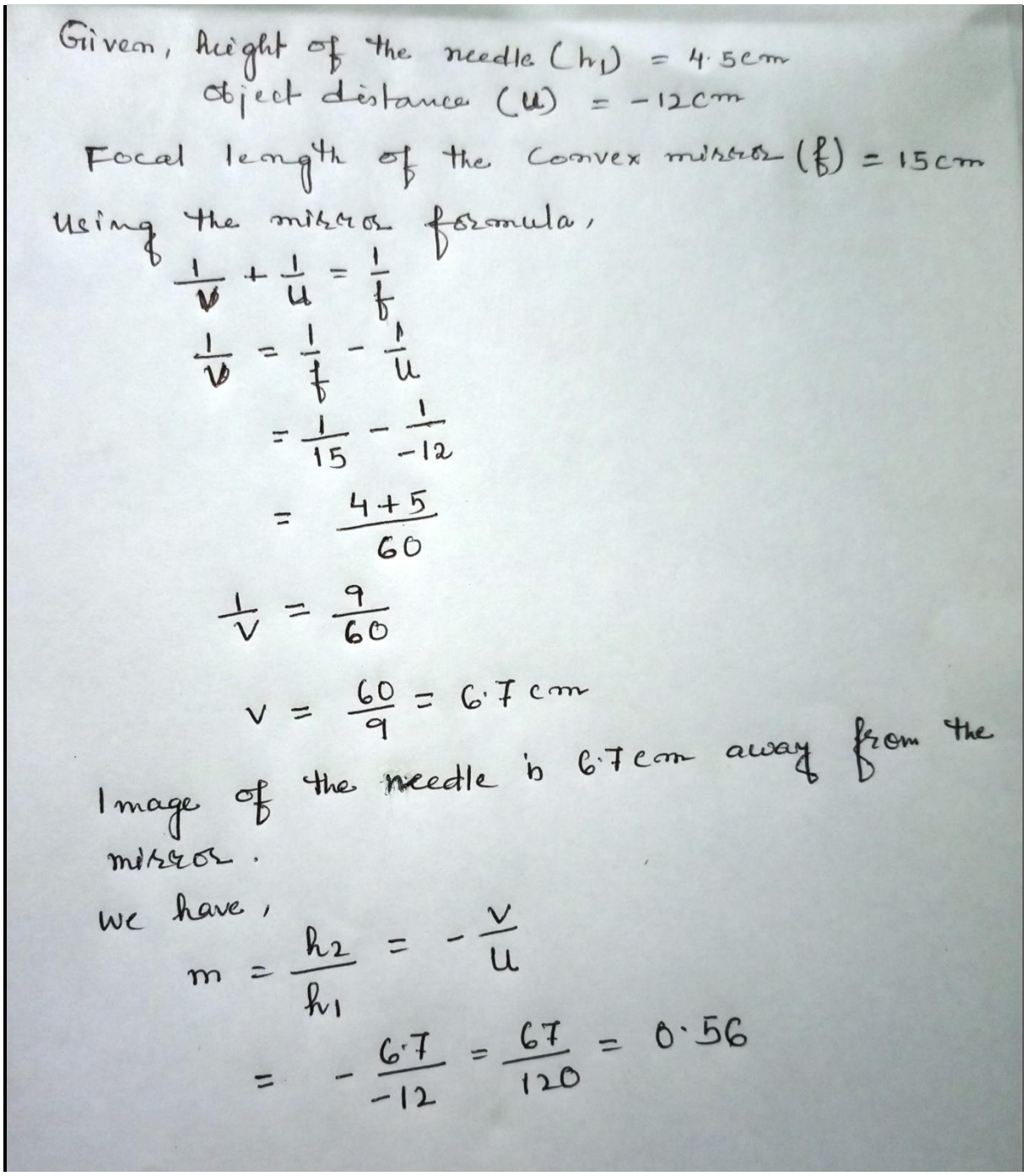
Ans: The power of a lens is defined as the reciprocal of its focal length. It is represented by the letter P.

The SI unit of power of a lens is dioptre.

When a number of thin lenses are placed in direct contact with each other, the power of the combination of lenses is equal to the algebraic sum of the powers of individual lens.

12. A 4.5cm needle is placed 12cm away from a convex mirror of focal length 15 cm. Give the location of image and magnification. Describe what happens to the image as the needle is moved farther from the mirror.

Solution:




13. Which lens can be used as a magnifying glass? For which position of object does a convex lens form:

(a) a virtual and erect image?

(b) a real and inverted image of same size as that of object? Draw labeled ray diagrams to show the formation of the required image in each of the above two cases.

Ans: A convex lens is used as a magnifying glass.

(a) Refer fig 10.16(f) page-190

(b) Refer fig 10.16(c) page-189

14. For driving a car what type of mirror would you prefer to see the traffic at your back and why?

Ans: We prefer convex mirror for observing the traffic behind us because its field of view is much larger than the plane mirror.

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

Ans: If the lower part of the lens is blackened the complete image will be formed but its intensity will decrease.

**16. An object 5 cm in length is held 25 cm away from a converging lens of focal length 10 cm. Draw the ray diagram and find the position, size and the nature of the image formed.**

**Solution:** Given, $h_0$ = 5 cm

Distance of the object from converging lens, u = -25 cm

Focal length of converging lens, f = 10 cm

Using lens formula,

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

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{10} - \frac{1}{25} = \frac{15}{250}$$

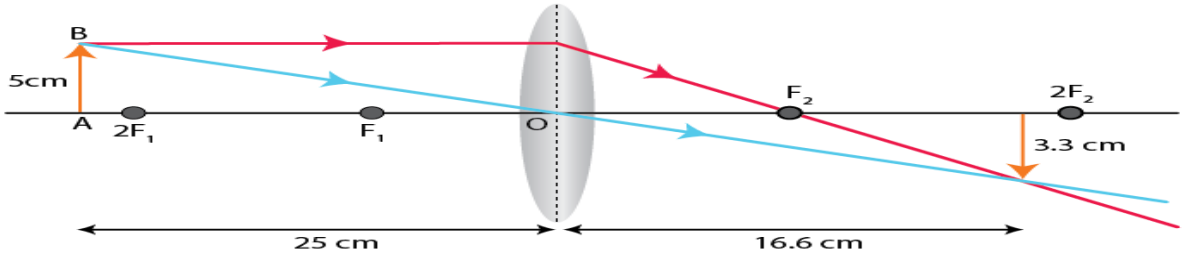
$$v = \frac{250}{15} = 16.66cm$$

$$Also,\ for\ a\ converging\ lens,\ \frac{h_i}{h_0} = \frac{v}{u}$$

$$h_i = \frac{v}{u} \times h_0 = \frac{50 \times 5}{3 \times (-25)} = \frac{10}{-3} = -3.3cm$$

Thus, the image is real and inverted.

The ray diagram is shown below.




**17. A concave lens of focal length 15 cm forms an image 10 cm from the lens. How far is the object placed from the lens? Draw the ray diagram.**

**Solution:** Given,

Focal length of concave lens ($OF_1$), f = – 15 cm

Image distance, v= – 10 cm

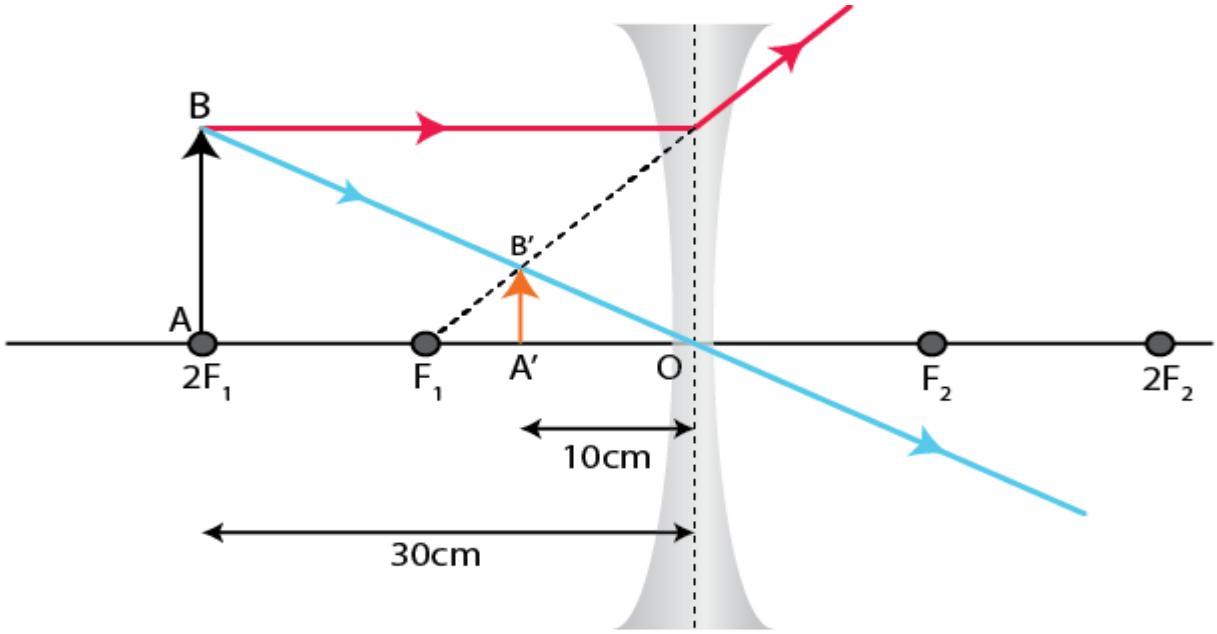
Using lens formula,

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

$$\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = -\frac{1}{10} - \frac{1}{-15} = -\frac{1}{10} + \frac{1}{15}$$

$$v = -\frac{5}{150} = -30cm$$

The negative value of u indicates that the object is placed 30 cm in front of the lens. This is shown in the following ray diagram.




**18. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm. Find the position and nature of the image.**

**Solution:** Given,

Focal length of convex mirror (f) = +15 cm

Object distance (u) = – 10 cm

Using mirror formula,

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

$$\frac{1}{v} = \frac{1}{15} - \frac{1}{-10} = \frac{2+3}{30}$$

$$v = \frac{5}{30} = 6cm$$

$$Magnification = \frac{-v}{u} = \frac{-6}{-10} = 0.6$$

Thus, the image is virtual and erect.

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

**Ans:** The positive sign means image formed by a plane mirror is virtual and erect. Since the magnification is 1 it means that the size of the image is equal to the size of the object.

**20. An object 5 cm is placed at a distance of 20 cm in front of a convex mirror of radius of curvature 30 cm. Find the position, nature and size of the image.**

**Solution:** Given,

Object distance (u) = – 20 cm

Object height (h) = 5 cm

Radius of curvature (R) = 30 cm

Radius of curvature = 2 × Focal length

R = 2f

f = 15 cm

Using mirror formula,

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

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

$$= \frac{1}{15} + \frac{1}{20} = \frac{4+3}{60} = \frac{7}{60}$$

$$v = 8.57cm$$

$$The\ positive\ value\ of\ v\ indicates\ that\ the\ image\ is\ formed\ behind\ the\ mirror$$

$$Magnification, m = -\frac{Image\ Distance}{Object\ Distance} = \frac{-8.57}{-20} = 0.428$$

$$The\ positive\ value\ of\ magnification\ indicates\ that\ the\ image\ formed\ is\ virtual$$

$$Magnification, m = \frac{Height\ of\ the\ image}{Height\ of\ the\ object} = \frac{h^1}{h}$$

$$h^1 = m \times h = 0.428 \times 5 = 2.14cm$$

The positive value of image height indicates that the image formed is erect.

Hence, the image formed is erect, virtual, and smaller in size.

**21. An object of size 7.0 cm is placed at 27 cm in front of a concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed, so that a sharp focused image can be obtained? Find the size and the nature of the image.**

**Solution:** Given,

Object distance (u) = – 27 cm

Object height (h) = 7 cm

Focal length (f) = – 18 cm

Using mirror formula,

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$
$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$$
$$= -\frac{1}{18} + \frac{1}{27} = -\frac{1}{54}$$

$$v = -54cm$$

$$The\ screen\ should\ be\ placed\ at\ a\ distance\ of\ 54cm\ in\ front\ of\ the\ given\ mirror$$

$$Magnification, m = -\frac{Image\ Distance}{Object\ Distance} = \frac{-54}{27} = -2$$

$$The\ negative\ value\ of\ magnification\ indicates\ that\ the\ image\ formed\ is\ real$$

$$Magnification, m = \frac{Height\ of\ the\ image}{Height\ of\ the\ object} = \frac{h^1}{h}$$

$$h^1 = m \times h = 7 \times -2 = -14cm$$

Hence, the nature of the image is real and inverted.

**22. Find the focal length of a lens of power -2.0 D. What type of lens is this?**

**Solution:** Given,

Power of lens (P) = 1/f

P = -2D

f = -1/2 = -0.5 m

A concave lens has a negative focal length. Therefore, it is a concave lens.

**23. A doctor has prescribed a corrective lens of power +1.5 D. Find the focal length of the lens. Is the prescribed lens diverging or converging?**

**Solution:** Given,

Power of lens (P) = 1/f

P = 1.5D

f = 1/1.5 = 10/15 = 0.66 m

A convex lens has a positive focal length. Therefore, it is a convex lens or a converging lens.

**Tick the correct option:**

1. (b) 2. (a) 3. (b) 4. (d) 5. (b)

In-text questions page-177

**1. Ans:** Light rays that are parallel to the principal axis of a concave mirror converge at a specific point on its principal axis after reflecting from the mirror. This point is called the principal focus of the concave mirror.

**2. Solution: Given,**

Radius of curvature (R) = 20 cm

Radius of curvature of the spherical mirror = 2 × Focal length (f) R = 2f

f= R/2 = 20 / 2 = 10

Therefore, the focal length of the spherical mirror is 10 cm.

**3. Ans:** Concave Mirror.

**4. Ans :** Convex mirror is preferred as a rear-view mirror in cars and vehicles as it gives a wider field of view, which helps the driver to see most of the traffic behind him.

In-text questions page-180

**1. Solution: Given,**

Radius of curvature (R) = 32 cm

Radius of curvature = 2 × Focal length (f)

R= 2ff = R/2 = 32/2 = 16

Therefore, the focal length of the given convex mirror is 16 cm.

**2. Solution: Given,**

Magnification produced by a spherical mirror:

$$m = \frac{Height\ of\ the\ image}{Height\ of\ the\ object} = -\frac{Image\ Distance}{Object\ Distance}$$

$$m = \frac{h_1}{h_0} = -\frac{u}{v}$$

$$Let\ the\ height\ of\ the\ object, h_0 = h$$

$$Then,\ height\ of\ the\ image\ h_1 = -3h\ (Image\ formed\ is\ real)$$

$$-\frac{3h}{h} = -\frac{v}{u}$$

$$\frac{v}{u} = 3$$

Object distance (u) = – 10 cm

v = 3 × (- 10) = – 30 cm

Therefore, image is formed 30 cm in front of the mirror.

In-text questions page-185

**1. Ans:** Towards the normal. Because speed of light in water is less as compared to air.

**2. Solution:**

Refractive index of a medium (nm) = Speed of light in vacuum/Speed of light in the medium

Speed of light in vacuum (c) = 3 × 108 m/s

Refractive index of glass (ng) = 1.50

Speed of light in the glass (v) = Speed of light in vacuum/ Refractive index of glass

= c/ng

=3 × 108/1.50 = 2x 108 ms-1.

**3. Find out, from Table, the medium having highest optical density. Also find the medium with lowest optical density.**

| **Material medium** | **Refractive index** | **Material medium** | **Refractive index** |
|---|---|---|---|
| **Air** | 1.0003 | Canada Balsam | 1.53 |
| **Ice** | 1.31 | – | – |

| | | | |
|---|---|---|---|
| **Water** | 1.33 | Rock salt | 1.54 |
| **Alcohol** | 1.36 | – | – |
| **Kerosene** | 1.44 | Carbon disulphide | 1.63 |
| **Fused quartz** | 1.46 | Dense flint glass | 1.65 |
| **Turpentine oil** | 1.47 | Ruby | 1.71 |
| **Benzene** | 1.50 | Sapphire | 1.77 |
| **Crown glass** | 1.52 | Diamond | 2.42 |

**Ans:**

Lowest optical density = Air

Highest optical density = Diamond

The optical density of a medium is directly related with its refractive index. A medium with the highest refractive index will have the highest optical density and vice-versa.

It can be observed from the table that air and diamond respectively have the lowest and highest refractive index. Hence, air has the lowest optical density and diamond has the highest optical density.

**4. Ans:** In kerosene, the light travel faster.

**5. Ans:** Diamond has a refractive index of 2.42 which means that the speed of light in diamond will reduce by a factor of 2.42 as compared to its speed in the air. In other words, the speed of light in diamond is 1/2.42 times the speed of light in vacuum.

In-text questions page-193

**1. Ans:** Dioptre is the SI unit of power of lens is denoted by the letter D. 1 dioptre can be defined as the power of a lens of focal length 1 metre.

**2. A convex lens forms a real and inverted image of a needle at a distance of 50 cm from it. Where is the needle placed in front of the convex lens if the image is equal to the size of the object? Also, find the power of the lens.**

**Solution: Given,**

The position of image should be at 2F, since the image is real and same size.

It is given that the image of the needle is formed at a distance of 50 cm from the convex lens. Therefore, the needle is placed in front of the lens at a distance of 50 cm.

Object distance (u) = – 50 cm

Image distance, (v) = 50 cm

Focal length = f

Using lens formula,

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

$$\frac{1}{f} = \frac{1}{50} - \frac{1}{-50}$$

$$= \frac{1}{50} + \frac{1}{50} = \frac{1}{25}$$

$$f = 25cm = 0.25m$$

$$Power\ of\ lens,\ P = \frac{1}{f(in\ metres)} = \frac{1}{0.25} = +4D$$

**3. Solution: Given,**

Focal length of concave lens (f) = 2 m

Power of lens (P) = 1/f = 1/ (-2) = -0.5D

**CHAPTER-11 (THE HUMAN EYE AND THE COLOURFUL WORLD)**

**TEXTBOOK EXERCISES (Page number: 207- 209)**

**1. The human eye can focus objects at different distances by adjusting the focal length of the eye lens. This is due to**

**(a) presbyopia**

**(b) accommodation**

**(c) near-sightedness**

**(d) far-sightedness**

**Ans:** (b) accommodation

**2. The human eye forms an image of an object at its**

**(a) cornea**

**(b) iris**

**(c) pupil**

**(d) retina**

**Ans:** (d) retina

**3. The least distance of distinct vision for a young adult with normal vision is about**

**(a) 25 m**

**(b) 2.5 cm**

**(c) 25 cm**

**(d) 2.5 m**

**Ans:** (c) 25 cm

**4. The change in focal length of an eye lens is caused by the action of the**

**(a) pupil**

**(b) retina**

**(c) ciliary muscles**

**(d) iris**

**Ans:** (c) ciliary muscles

**5. A person needs a lens of power -5.5 dioptres for correcting his distant vision. For correcting his near vision he needs a lens of power +1.5 dioptre. What is the focal length of the lens required for correcting (i) distant vision, and (ii) near vision?**

**Solution:**

The power (*P)* of a lens of focal length f is given by the relation

*Power (P)* = 1/*f*

(i) Power of the lens (used for correcting distant vision) = – 5.5 D

Focal length of the lens (*f)* = 1/*Pf*= 1/-5.5 = -0.181 m

The focal length of the lens (for correcting distant vision) is – 0.181 m.

(ii) Power of the lens (used for correcting near vision) = +1.5 D

Focal length of the required lens (*f)* = 1/*P*

*f* = 1/1.5 = +0.667 m

The focal length of the lens (for correcting near vision) is 0.667 m.

**6. The far point of a myopic person is 80 cm in front of the eye. What is the nature and power of the lens required to correct the problem?**

**Solution: Given,**

Object distance (u) = infinity = ∞

Image distance (v) = – 80 cm

Focal length = f

Using lens formula,

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

$$-\frac{1}{80} - \frac{1}{\varpi} = \frac{1}{f}$$

$$\frac{1}{f} = -\frac{1}{80}$$

$$f = -80cm = -0.8cm$$

$$We\ know,$$

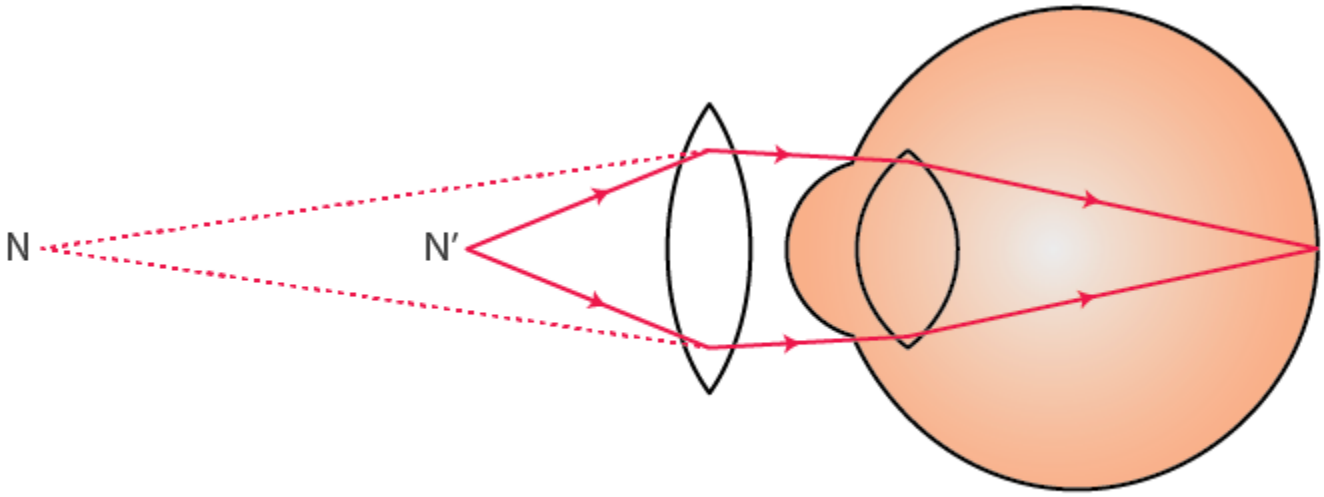
$$Power, P = \frac{1}{f(in\ metres)}$$

$$P = \frac{1}{-0.8} = -1.25D$$

A concave lens of power – 1.25 D is required by the individual to correct his defect.

**7. Make a diagram to show how hypermetropia is corrected. The near point of a hypermetropic eye is 1 m. What is the power of the lens required to correct this defect? Assume that the near point of the normal eye is 25 cm.**

**Ans:** An individual suffering from hypermetropia can see distinct objects clearly but he or she will face difficulty in clearly seeing objects nearby. This happens because the eye lens focuses the incoming divergent rays beyond the retina. This is corrected by using a convex lens. A convex lens of a suitable power converges the incoming light in such a way that the image is formed on the retina, as shown in the following figure.




Correction for hypermetropic eye

The convex lens creates a virtual image of a nearby object (N' in the above figure) at the near point of vision (N) of the individual suffering from hypermetropia.

The given individual will be able to clearly see the object kept at 25 cm (near point of the normal eye), if the image of the object is formed at his near point, which is given as 1 m.

Object distance, $u$= – 25 cm

Image distance, $v$= – 1 m = – 100 m

Focal length, $f$

Using the lens formula,

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

$$-\frac{1}{100} - \frac{1}{-25} = \frac{1}{f}$$

$$\frac{1}{f} = -\frac{1}{25} - \frac{1}{100}$$

$$\frac{1}{f} = \frac{4-1}{100}$$

$$f = \frac{100}{3} = 33.3cm = 0.33m$$

$We\ know,$

$$Power, P = \frac{1}{f(in\ metres)}$$

$$P = \frac{1}{0.33} = +3.0D$$

A convex lens of power +3.0 D is required to correct the defect.

**8. Why is a normal eye not able to see clearly the objects placed closer than 25 cm?**

**Ans:** This is because ciliary muscles cannot change the focal length of the eye lens beyond a certain limit.

**9. What happens to the image distance in the eye when we increase the distance of an object from the eye?**

**Ans:** The image is formed on the retina even on increasing the distance of an object from the eye. For this eye lens becomes thinner and its focal length increases as the object is moved away from the eye.

**10.** Mention the factor on which scattering of light depends. Why does the sky appear dark in space?

**Ans: Depending factors are:**

**(i) Wavelength of the light**

**(ii) Size of the particles**

**In space, there is no atmosphere and no refraction .So, it is dark.**

**The sky appears dark due the absence of scattering of light.**

**11.(a) State two main causes of a person developing near sightedness. How can this defect be corrected?**

**(b) What is astigmatism and how is this vision defect corrected?**

**Answers:**

**(a)Two main causes of a person developing near sightedness are;**

**(i) Excessive curvature of the eye lens**

**(ii)Elongation of the eye ball**

**This defect is corrected by using a concave lens of suitable power.**

**(b) A person unable to see equally in all directions is known as astigmatism.**

**This vision is corrected by using cylindrical lens.**

**12. An older person is unable to see clearly nearby objects as well as distant objects.**

**(i) What defect of vision is he suffering from?**

**(ii) What kind of lens will be required to see clearly the nearby as well distant objects? Give reasons.**

**Answers: (i) Presbyopia**

**(ii) Both kinds of lenses i.e. convex lens for long sightedness and concave lens for short sightedness.**

**13. Why does it take some time to see the objects in a dim room when we enter the room from bright sunlight outside?**

**Ans: It is due to the fact that in bright sunlight the pupil of our eye is small .Hence very little light enters in our eye.**

**14. Explain the following terms connected with the eye:**

**(i) Ciliary muscles (ii) Accommodation (iii) Blind spot**

**Answers: (i) Ciliary muscles are muscles which hold the eye lens.**

**(ii) The ability of the eye lens to adjust its focal length is called accommodation.**

**(iii) The small circular area at the back of the retina where the optic nerve enters the eye ball and which is devoid of rods and cones and is not sensitive to light is called blind spot.**

**15. What are hypermetropia and myopia? What are their causes? How are they rectified?**

**Ans: Hypermetropia is also known as far-sightedness. A person with hypermetropia can see distant objects clearly but cannot see nearby objects distinctly.**

**Causes of hypermetropia are: (i) The focal length of the eye lens is too long (ii) The eye ball has become too small.**

**This defect can be rectified by using a convex lens of appropriate power.**

**Myopia is also known as near-sightedness. A person with myopia can see nearby objects clearly but cannot see distant objects distinctly.**

**Causes of are myopia are:**

**(i) Excessive curvature of the eye lens**

**(ii)Elongation of the eye ball**

**This defect is rectified by using a concave lens of suitable power.**

**16. Why do stars twinkle?**

**Ans:** 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.

**17. Explain why the planets do not twinkle?**

**Ans:** Unlike stars, planets don't twinkle. Stars are so distant that they appear as pinpoints of light in the night sky, even when viewed through a telescope. Because all the light is coming from a single point, its path is highly susceptible to atmospheric interference.

**18. Why does the Sun appear reddish early in the morning?**

**Ans:** White light coming from the sun has to travel more distance in the atmosphere before reaching the observer. During this, the scattering of all colored lights except the light corresponding to red colour takes place and so only the red colored light reaches to the observer. Therefore the sun appears reddish at sunrise and sunset.

**19. Why does the sky appear dark instead of blue to an astronaut?**

**Ans:** The sky appears dark instead of blue to an astronaut, as scattering of light does not take place outside the earth's atmosphere.

**Tick the correct option:**

1. (c) 2. (b) 3. (b) 4. (a)

In-text questions page-200

**1. Ans:** The ability of an eye to adjust focal length of the eye-lens with the help of ciliary muscles is called power of accommodation .

**2. Ans:** An individual with a myopic eye should use a concave lens of focal length 1.2 m so that he or she can restore proper vision.

**3. Ans: The far point is infinity and the near point is 25 cm from eye.**

**4. Ans:** The student is suffering from short-sightedness or myopia. This can be corrected by the use of concave or diverging lens of an appropriate power.