Science

Textbook for Class VIII

Rajasthan State Institute of Educational Research and Training, Udaipur

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Foreword

The Changes in scenario of the Society and the nation entail the changes in the system of education which determines and accelerate the process of development in them. Education, beside other factors, is an important factor, responsible for the development of the society and the nation. To make School education, effective, useful and interesting, the changes in the curriculum from time to time is an essential step. The national curriculum framework, 2005 and the Free and Compulsory Child Education Right Act, 2009 in the present time make it evident that a child occupies a pivotal place in all the teaching-learning activities, conducted in any educational institution. Keeping this view in mind, our process of causing learning amongst the students should be such that they construct knowledge on their own on the basis of the knowledge acquired through their experiences. A child should be allowed maximum freedom in the process of learning and for that – teacher should act as a guide and helper rather than a preacher. To make the curriculum easily accessible to children/students, a text book is an important means. That is why the government of Rajasthan has got the new text book written by making necessary changes in them in the light of the changes made the curriculum.

While writing a text book it has been kept in view that the text book should be easy and comprehensible, with the help of simple language and interesting and attractive with the inclusion of pictures and varied activities through which the learners may not only imbibe the knowledge and information, contained in them but also associate themselves with the social, neighborhood and local environment along with the development of and adherence to the knowledge about historical, cultural glory and constitutional values of the country so as to establish themselves as sincere, good and worthy citizens of our country, India.

I very humbly request the teachers that they should not only confine themselves to the completion of the teaching of the text book but also to present it in such a manner that a child gets ample opportunities of learning and accomplishing the objectives of teaching-learning on the basis of the curriculum and his/her experiences.

The state Institute of Educational Research and Training (SIERT), Udaipur acknowledges its thankfulness to all those government and private institutions viz. National Council of Educational Research and Training, New Delhi, State and National Census Departments, Ahad Museum, Udaipur. Directorate of Public Relations, Jaipur, Rajasthan, Rajasthan Text Book Board, Jaipur, Vidya Bharati, All India Educational Institute, Jaipur,

Vidya Bhawan Reference Library, Udaipur, different writers, newspapers and magazines, publishers and websites that have cooperated with us in choosing and making the required material available for writing and developing the text book.

Inspite of best efforts, if the name of any writer, publisher, institution, organization and website has not been included here, we apologize for that and extend our thankfulness to them. In this connection, their names will be incorporated in the next editions of this book in future. It (SIERT) also extends thanks to Mr. Damodar Lal Kabra, Retd. Principal, Chittorgarh for cooperation with us in the translation work of this book.

To enhance the quality of the text books, we have received timely guidance and precious suggestions from Shri Kunji Lal Meena Secretary, Elementary Education, Govt. of Rajasthan, Shri Naresh Pal Gangwar Secretary, Secondary Education Govt. of Rajasthan, and Commissioner National Secondary Education Council, Shri Suwa Lal Meena, Director Secondary Education, Govt. of Rajasthan, Shri Babulal Meena, Director Elementary Education, Govt. of Rajasthan and Shri B.L. Jatawat, Commissioner Elementary Education, Govt. of Rajasthan Jaipur, and as such the institute (SIERT) expresses its heartiest gratefulness to all of them.

This book has been prepared with the financial and the technical support of UNICEF. In this connection we are grateful to Mr. Samuel M, Chief, UNICEF Jaipur, Sulgana Roy, Education Specialist and all the related officers of UNICEF for their timely support and cooperation. Besides them the institute appreciates the efforts of all those officers and other members of the staff who have directly or indirectly cooperated with us in accomplishing the task of book writing and publishing it.

I am highly delighted to submit this book to you all with this belief in mind that it will not only prove beneficial to the teachers and the students but also serve as an effective link in the teaching-learning process and the personality development of the students.

To value thoughts and suggestions is a specific feature of a democracy; therefore the SIERT, Udaipur will always welcome your precious thoughts and suggestions for improving the quality of this book and thus make it better in every respect.

Thanks,

Director
SIERT, Udaipur

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For the Teachers

National Curriculum Frame Work, 2005 has thrown new light on the construction of knowledge according to which analysing of one's own experiences, developing of one's own understanding about something/ somebody and explaining the meaning of something is called knowledge. Reaching knowledge means to establish one's own dialogue with other explanations and standard knowledge and information.

The great educationist and thinker Gijubhai has said, "Learning is an art and methods / techniques of learning are its tools. Those teachers who have good and proper knowledge of using these tools become expert in the art of teaching-learning, though their speed in this process may be a bit slow. But those teachers who have not had any preparation for using this art remain far away from the art of teaching-learning.

Just as a text book helps explain things to students and establish coordination between other explanations. Similarly a teacher 's job is not confined only to serve as a resource of doling out knowledge but to understand the process of knowledge construction in the children, boost it and give it a concerete shape. The N.C.F. 2005 and the principles of guidelines to the Right to Education Act, 2009 have been the main–stay of the process involved in writing this text book (of science). While writing this text book, the important points, facts and subject matter contained in N.C.F., 2005, new Delhi and the curriculum and the text books of other states have been included in it with reference to Rajasthan after careful study of them (the books, curriculum of other states).

The main and important topics and their subject contents have been written in the form of dialogues, based on the experiments (practical work) and activity method. The subject matter of science has been written and presented through varied activities viz observing, inquiring, classifying, analysing, synthesizing, discriminating, concluding and propounding, etc. which have been incorporated through different steps at proper places in the lessons so that the students may construct knowledge by accomplishing these tasks on their own. The teachers are therefore requested to provide the learners ample chances to complete those tasks during the teaching learning process. And for that they (teachers) should encourage them (learners). The teachers

should play the role of guides and help the learners form concepts about the subject. Efforts have been made to incorporate the facts and figures and points related to Rajasthan, India and the world in the subject matter of the lessons in the text book so that the learners may get acquainted with their local, neighbourhood environment, culture and values along with those of their country and the world

By means of this book efforts have been to foster among the learners the feelings of tolerance, equality, consciousness towards the protection of environment, care for good health and healthy nutrition and the inculcation of scientific altitude along with the development of sensitivity towards cleanliness, sanitation and healthy habits. It is expected of the teachers that they will instil and develop the above stated feelings and emotions and values in the learners so that they may become the cultured, capable, suitable and disciplined citizens who may take part actively in the development of the society , the state and the nation. All this entails on the teachers to have not only full subject knowledge but also to have the sense of responsibility and dedication towards their profession. It is only then the will be able to prove himself as a model teacher for the students.

Again it is expected of the teachers that they will teach the subject matter, in the newly written books, in the light of the above stated objectives with zeal, fervor and dedication, using the above mentioned techniques so that the learners may be grounded in quality and value oriented education and thereby they may grow as responsible, dutiful and hardworking students of the country.

Contents

Chapter 1

Agriculture Management

POINTS TO STUDY

1.1 Crops and its types
1.2 Agricultural practices
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1.4 Crops and environment

1.1 Crops and its types

We have earlier studied that all the living organisms need food for their growth development and being alive. Plants can prepare their own food but animals cannot prepare their own food. Animals are dependent mainly on plants to for their food. To fulfill the food requirements of population 1.25 core people, regular production of crops, proper management, care and planned distribution is necessary.

India is a predominantly agricultural country. About 80% of the population resides in the villages here. Along with the geographical diversity, there is a lot of diversity in the eating habits also. Let us discuss on table 1.1 to obtain the information about various crops found in your area.

Table 1.1 General information about plant

S.N.	Plant Name	Location where these are grown generally	duration of obtaining the crop
1.	Mango	On the margins of field	Upto many years
2.	Plum	On the Margins and in between of fields at Fixed intervals	Fruits can be obtained every year
3.	Wheat	In a large field area	Production is once in a year in less duration
4.	Barley		
5.	Gram		
6.	Mustard		
7.	Maize		
8.	Cauliflower		
9.	Lady's finger		
10.	Carrot		

(Students try to understand and fill the table 1.1 with their experience and help of their parents and teachers)

On the basis of observations made in Table 1.1 we can say that the plants which are of less use in food are grown in comparatively less areas while those which are mainly used in food are grown in larger area.

On the basis of above information we can say that plants which are grown at definite intervals of time to fulfill the food requirements of humans and animals are called **Crop plants** and the plants which are grown in a definite season are collectively called **Crop**.

When only a single type of plants are grown in a huge area, then it is called crop.

Come, let us do

Complete the table 1.2 by writing the season of growing and the estimated time from sowing till cutting of the plants found in your nearby areas.

Table 1. 2 Name, Season and Time duration of crop plants.

Name of Crop Plant	Season when crop is obtained (Winter or summer or rainy)	Estimated time (in months) from sowing till cutting.
Wheat		
Barley		
Maize		
Gourd		
Jowar		
Bajra		
Moth		
Mustard		
Til		
Water Melon		

(Students try to understand and fill the table with their experience and help of their parents and teachers)

From table 1.2, We have know that some crops are grown in summer, some in winter and some in rainy season i.e. their growing seasons are different. Crops grown in different seasons have different life spans also come, let us categorize the crops of our area on the basis of season.

How many types of crops are there based on the season ?

Categories the crops grown in your field on the basis of season.

Types of Crops :

Crops are categorized mainly into 3 groups on the basis of season. These are as follows : -

1) Rabi Crops
2) Kharif Crops
3) Zaid Crops

- **Rabi Crops :** These are crops grown between October to February. Example - Wheat, Barley, Gram, Peans, Mustard etc.
- **Kharif Crops :** These are the crops grown between June to September. Example - Maize, groundnut, linseed, green gram, black gram etc.
- **Zaid Crops :** These are crops grown between March to June. Example : Musk melon, Water Melon, cucumber and other vegetables

We can classify the crops on the basis of their common use as follows :

Table 1.3, Classification of Crops on he basis of use.

S.N.	Crops of similar characters	Example	Use
1.	Cereal crops	Wheat, Barley, Howar, Maize, Bajra etc.	Chapati, Porridge
2.	Pulses	Arhar, Green Gram, Gram, Black gram	Pulses
3.	Oil yielding crops	Ground nut, Linseed, Flax seeds, Mustard, Soyabean, castor	Oil
4.	Spices	Chilly, coriander, Ajwain, Lumin seeds, Turmeric	Spices
5.	Fruits and vegetables	Mango, Ber, Malta, Lady's finger, Tinda, Gourd, Cauliflower, Sweet Lime	Fruits and Vegetables
6.	Other crops	Fodder and Medicines	Fodder and Medicines

Now we will study about the entire process starting before the sowing of crops till its cutting. You might have seen crops in the field. You mighty also have seen the farmers engaged in different agricultural practices like irrigation, weeding, harvesting etc.

All the processes involved right from the preparation of soil, before sowing, upto the sale of the harvest market are called practices of crop productions.

Let us Study about these various practices of crop production.

1.2 Agricultural practices

To ensure a good crop yield several activities are undertaken by farmers from sowing till cutting.

All these activities done by the farmers for crop production are called agricultural practices.

Have you ever wondered what all practices are undertaken by the farmer. To produce crop ? Think and answer -

Following are the steps of agriculture :

1. Ploughing
2. Sowing of seeds
3. Providing manure or fertilizers
4. Irrigation
5. Crop protection
6. Harvesting
7. Threshing
8. Storage

1. Ploughing :

You might have visited your nearby fields. You might have seen that sometimes the fields are empty and at other times, there are crops before sowing of seeds, what all activities are carried out in the field ? Let us have a look.

First of all farmer ploughs the field. What sources of ploughing have you seen ?

The field can be ploughed by different modes like -

(1) By animals (Traditional method)

(2) By tractor

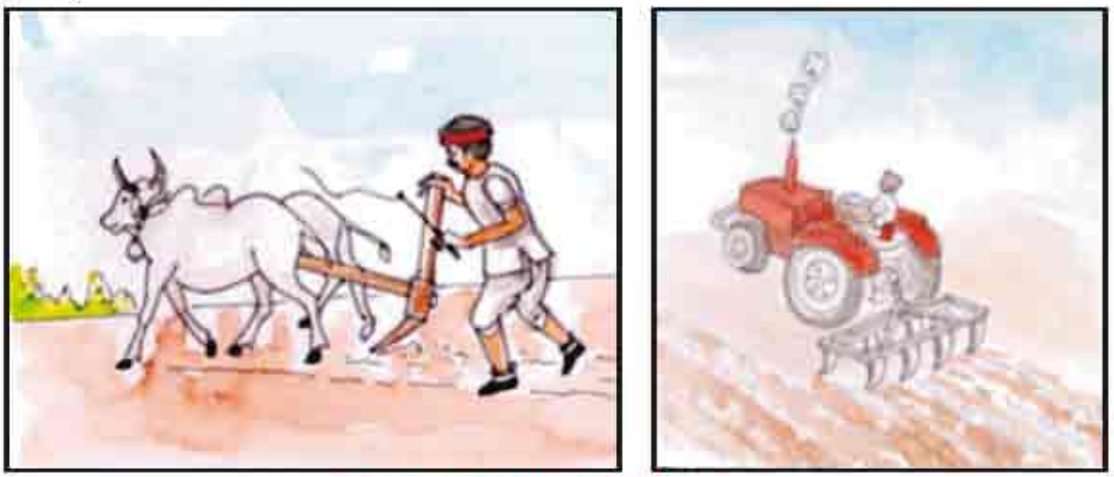

Fig 1.1 Modes of ploughing

Why the field is ploughed before sowing ?

First of all soil is prepared for growing crop by the farmer By ploughing he loosens and turns the soil. Loose soil has following benefits :

- Seed reaches below the uppermost layer which makes it's germination easy.
- Roots can penetrate deeper into the soil.
- Roots of new plants can respire easily.
- Loosened soil is helpful for the growth of microorganisms, earthworms living in the soil.
- The upper layer is the helpful for plant growth upto certain depth, by turning it up and down it gets evenly distributed.

To turn the soil up and down and loosen it by use of plough is called ploughing.

Tools of agriculture

A farmer uses various types of agricultural implements like- plough, hoe, cultivator etc.

2. Sowing

After preparing the soil , the farmer sows the seeds of the crop being grown. Before this he selects the best quality of seeds to ensure healthy crop and maximum grain production. Let us do an activity for selection of healthy seeds -

Fig 1.2 Plough

Fig 1.3 hoe

Fig 1.4 Cultivator

Activity 1

Take a bucket filled with water. Put some green gram seeds in it. Leave then untouched for some time and then observe. What do you observe ? Some of the grains settle down while others float on the surface. Why do some grains float on the surface ? Those which are floating on the surface are damaged and hollow. Thus being lighter, they float while healthy seeds are not hollow and get settle down at the bottom of the bucket. This way farmers identify healthy grains and sort them.

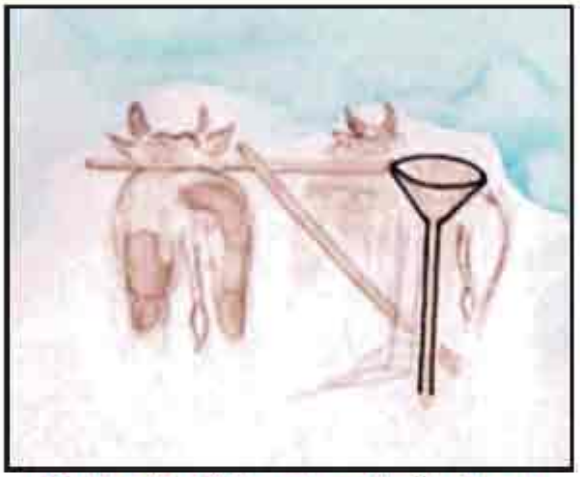

Fig 1.5 Traditional method of seed Sowing

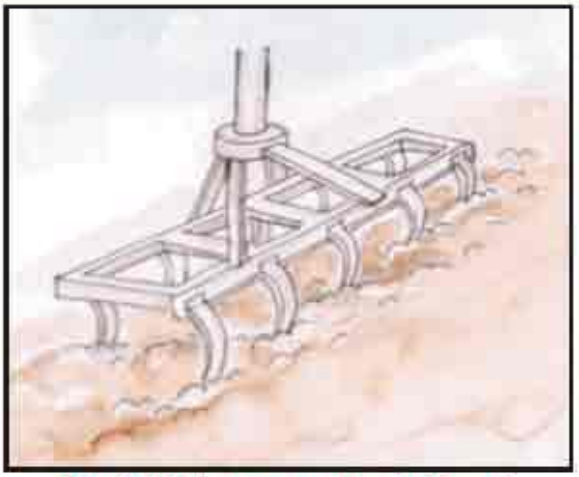

Fig 1.6 Modern method of seed sowing- seed drill

3. Providing manure and fertilizers

You might have seen farmers adding manure to the fields. Why do they add manure ?

To maintain the nutrition level of soils or to maintain the fertility of soil, some substances are added to the soil, these are called manure and fertilizers.

Differences between manure and fertilizers.

We have studied two types of substances to increase the soil fertility i.e. manure and fertilizers. You might have seen these being added to the soil. Both increases the fertility. Then why they are named differently? What is the differences between them ?

Come let us know -

Manure is natural and biotic while fertilizers are synthetic. Natural manure is made in the fields like Gobar (Compost) and vermi compost etc. while fertilizers are made in the factories like urea, ammonium sulphates, super phosphate, potash etc.

Manure is better than fertilizers because natural manure contains more of humus and it increases the fertility of soil where as fertilizers lack humus. Thus bio manure should be used more.

Benefits of Bio Manure :

1) This manure is more capable to reorganize the soil.
2) Useful bacterial growth speeds up in this manure.
3) It keeps the soil loosened which makes the root respiration easy.
4) Bio manure increases the water holding capacity of the soil.

4. Irrigation

What is next activity done by the farmer after growing the crop and adding manure to it? The farmer gives water to the crop. We require water alongwith the food. In the same manner plants also require water for growth and development.

Irrigation is the process by which the water requirement of plant is fulfilled by time to time using various artificial means :

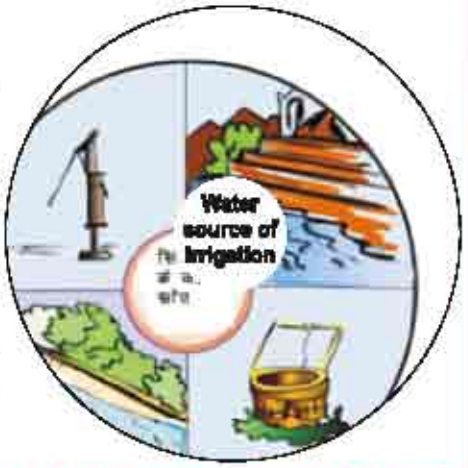

Fig 1.7 Water sources of irrigation

Benefits to the crop by Irrigation

1. For seed germination
2. To supply water to the leaves for transpiration
3. Through water nutrients reaches to various parts of plants.
4. It has an important role in growth and development of plant.

Sources of water for irrigation :

Farmers use water sources like rivers, pencils, wells, hand pump, canals for irrigation (fig 1.7).

Sources of Irrigation

Farmers uses various sources of irrigation to meet the requirement of crops. What are these sources.

Let us find out -

We uses various sources of irrigation which we can understand Fig. 1.8

Sources of Irrigation

1.Traditional sources

Chadas (Chain Pump)

2. Modern sources

Tubewell


Dhekli


Electric Pump


Rahat


Moat


Diesel Pump

Fig 1.8 sources of irrigation

We have seen various sources of irrigation in Fig. 1.8. Tell us how are they used for irrigation. Nowadays irrigation is done with tube well, diesel or electricity pumps, why is this so ? Modern sources take less time to irrigate more in comparision to the traditional sources. Water can be used wisely with these sources. Modern techniques of irrigation can be explained by following techniques.

Modern techniques of Irrigation

1. Sprinkler system (sprinkle from above)

2 .Drip System (Drop by drop irrigation in the roots)

Fig 1.9 Modern methods of irrigation

5. Protection of crops :

It is believed that when a farmer brings the harvested crop to his home, then his hard work reward as a success. But this is also not an easy process. During

this period also he has to face many problems. What could be these problems ? List all such problems.

Table 1.4 Description of problem faced by a farmer during cultivation

S.No.	Problems during the process of cultivation
1.	Weeds
2.	
3.	
4.	
5.	

Above problems result in low yield of crop which causes financial loss to the farmers. Let us understand the problems their adverse effects and preventive measures during crop cultivation.

Table 1.5 Problems in agriculture, adverse effect, preventive measures

Sr No.	Problem	Identification of problem	Adverse effect on crops	Preventive Measures
1.	Weeds	Unwanted plants that grow along with the crops and prevents the necessary nutrients from reaching the crop plants.	Crops do not get sufficient nutrients and proper sunlight.	Tilling from time to time. Use weedicides.
2.	Natural disaster	Flood, drought, cold, fire	Flooding in field, draining away of soil and manure, drying of crop or burning of crop.	Preparing proper water exit. Irrigation during drought. Preparation for prevention from fire.
3.	Diseases caused by insects, fungus, bacteria and virus	Deformity in leaves, Drying of stem, damage of fruits, low yield.	Damage in leaf, stem, fruit.	Spraying of insecticides, bacteriocides and fungicides.
4.	Animals	Harms the crops	Damage of crops	Fencing, preventive measures.

6. Harvesting

You might have seen crop being harvested in fields. When are the crops harvested?

After the ripening of crop, farmer cuts it, it is called harvesting.

When the crop ripes, it is either taken out from the roots or are cut from near the root. In early times sickle was used. Now a days also it is used at some places, but mostly the ripes farmers use harvesting machines for cutting the crops.

Harvesting by sickle

Harvesting by harvester machines

Fig: 1.10 Harvesting

7. Threshing

After harvesting, the crop is dried to remove any moisture. Then its grains are separated out from the chaff by the process of threshing.

- Farmers of small fields throws mixture in the air so that the wind blows away the lighter chaff while the heavier grains fall down.
- Farmers of large field do this work by combine machine or thresher which is a faster.

Threshing by hand

Threshing by combine machine

Fig 1.11 Sources of threshing

8. Storage

After threshing the farmer brings the grains, filled in the bags, at home and collects the chaff for fodder. He stores the food he had brought. He keeps the grains of required quantity at home, and rest he sales in the market. The protection of grains at home is also important. By various methods stored grains are protected from moisture, insects, mice and microbes. Large scale storage of grains is done in store houses called silos.

1.3 Important crops grown in different districts of Rajasthan

Table 1.6

S.N.	Crops	Main district of production
1.	Bajra	Alwar, Jaipur, Nagaur, Jodhpur, Sikar, Barmer
2.	Maize	Chittorgharh, Udaipur, Bhilwara, Banswara, Rajsamand
3.	Jowar	Ajmer, Pali, Tonk, Bharatpur, Alwar
4.	Rice	Hanumangarh, Bundi, Kota, Pratapgarh, Banswara
5.	Wheat	Shri Ganganagar, Hanumangarh, Alwar, Bharatpur, Bundi
6.	Barley	Jaipur, Hanumangarh, Sri Ganganagar, Alwar
7.	Moth	Churu, Bikaner, Nagaur, Jodhpur
8.	Gram	Hanumangarh, Sri Ganganagar, Bikaner, Jhunjhunu
9.	Green gram	Nagaur, Jodhpur, Jalore, Jaipur, Barmer
10.	Chawla	Jhunjhunu, Sikar, Nagaur
11.	Arhar	Udaipur, Tonk, Jaipur
12.	Groundnuts	Bikaner, Sikar, Churu, Jaipur
13.	Musturd	Sri Ganganagar, Alwar, Jaipur
14.	Tarameera	Sri Ganganagar, Jalor, Pali, Jaipur
15.	Soyabeen	Jhalawar, Chittor, Baran
16.	Cotton	Hanumangarh, Kota, Bundi, Sri Ganganagar
17.	Cumin	Jalore, Jodhpur, Barmer
18.	Coriander	Baran, Jhalawar, Kota

Table 1.7 Main fruits and vegetables producing areas in Rajasthan

S.N.	Fruits	Area
1.	Orange	Jhalawar
2.	Lemon	Dhaulpur
3.	Guava	Sawaimadhopur
4.	Peas or tomato	Jaipur
5.	Ber	Jaipur
6.	Amla	Jaipur
7.	Watermelon	Tonk
8.	Chilly	Sawai Madhopur
9.	Ginger	Udaipur
10.	Garlic	Kota
11.	Malta	Sri Ganganagar
12.	Grapes	Sri Ganganagar
13.	Cucumber	Bikaner
14.	Muskmelon	Pali
15.	Mango	Chittorgarh
16.	Fennel	Sirohi
17.	Carom Seed	Chittorgarh
18.	Onion	Jodhpur
19.	Banana	Banswara
20.	Sweet lime	Sri Ganganagar

1.4 Crops and Environment

We know that the environment surrounding us should be clean. For this we should keep ourselves and our surroundings clean. Along with this there should be greenery in our surrounding. Crops are green and throughout the year round one or the other crop is always there in the fields. Atmosphere also gets cleaned with the greenery. Thus crops directly effect the environment in the following ways:

1. Environment gets cleaned with crops.
2. Crops maintain the humidity in atmosphere.

3. They are helpful in controlling and regulating the amount of oxygen-carbon dioxide.
4. They regulate the temperature of the surroundings.
5. They protects the upper fertile layer of the soil from storms, winds and floods.
6. Lowers the air and noise pollution.
7. They provide life and protection to the animals.

Professor M.S. Swaminathan:

He was born on 7 August , 1925 at Kummkonam, Tamilnadu. Specialist in genetics, he is famous for his contribution in the field of green revolution. In 1966 , he hybridized seeds from Mexico with the home variety of Punjab and developed the hybrid variety which was high yielding variety. During the Green revolution, high yielding wheat and rice Seeds were sown in the fields. This revolution made India self dependent in the field of food grains. In the field of science and engineering M.S. Swaminathan was awarded with Padamshree in 1967, Padam Bhushan in 1972 and Padam Vibhushan in 1989.

What have you learnt

- When a single type of plants is grown in a large area, is called crop.
- On the basis of seasons crops are of three types: 1. Rabi 2. Kharif 3. Zaid
- There are various practices of agriculture : preparation of soil, sowing of seeds, adding manure and fertilizers, irrigation, protection of crops, harvesting, threshing, storage etc.
- Weeds- the unwanted plants that grow along with the crop, which do not allow the nutrients in the soil to reach the crop plants are called weeds.

EXERCISES

Choose the correct option:

1. Wheat is a crop of -
   (a) Rabi (b) kharif
   (c) Zaid (d) all of the above
2. Modern technique of irrigation is -
   (a) Charas (b) Dhekli
   (c) Electric pump (d) Rahat

Fill in the blanks:

1. The process of loosening the soil by use of a plough is called .....
2. Healthy seeds are ..... in weight and unhealthy seeds are .....
3. Sowing of only one type of soil continously lowers the ..... of soil.
4. On the basis of season crops are mainly of ..... types.

Short answer question:

(a) What is a crop?
(b) Give two examples each of Rabi, Kharif, and Zaid crops.
(c) What is threshing?
(d) What are the sources of irrigation?

Long answer questions

1. What are the modern techniques of irrigation ? Describe them.
2. What problems does a farmer faces while cultivation? What methods would you suggest to overcome those problems?

Activity work

1. Collect the samples of nitrogen containing chemical fertilizers used in the agriculture in your near by areas and paste them in scarp book. Also find out that for which crops are these used.
2. Plant trees in your school. Add different chemical fertilizers in them and observe them.
3. Contact with the farmers of your near by areas and what all activities the carry out for crop production.
4. Collect the information about cold stores and write down its importance.

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Chapter 2

Metals and Non-metals

Points to study

2.1 Metals and Non-metals in nature.
2.2 Physical properties of Metal and & Non-metals.
- Physical properties of metals
- Physical properties of non-metals

2.3 Chemical properties of Metals.
2.4 Chemical properties of Non-metals.
2.5 Uses of Metals & Non-metals in daily life.
2.6 Nobel metals or Inert metals
2.7 Alloys

2.1 Metals and Non-metals in Nature :

We see many different types of substance in our daily life. Like wooden chair, coal, aluminium sheet, bronze utensils, soil etc. All these substances are made up of different elements. Some substances are solid, shining and hard while some others are dull, soft and porous. Let us understand. Try identifying substances on the basis of their lustre (shine) and tabulated data in Table 2.1

Activity 1

Table 2.1 Identification of substances on the basis of their Lustre.

S.NO.	Name of substances	Lustrous and non-lustrous
1.	Copper glass	.....
2.	Aluminium sheet	.....
3.	Coal powder	.....
4.	Soil	.....
5.	Wooden chair	.....

From these some are metal and some are non-metals. Those substances which are shiny are generally metals while which are dull are non-metals. On the earth crust some metals like gold, platinum and some are non metals like sulphur and hydrogen etc are found. They are found in Free states as elements or in combined form as their oxides carbonates, sulphates and etc. Examples are aluminium, iron, manganese oxide and phosphorous. Let us learn about more properties of metals and non-metals.

2.2 Physical properties of Metals and Non-metals

• Physical properties of Metals

1. Physical state :

Activity 2

What are iron chair, steel utensils, gold and silver jewellery made up of? These are made up of hard and solid metals. At room temperature all the metals are solid except Mercury which is liquid at room temperature.

Fig. 2.1 Metal in solid state

2. Colour :

Metals are generally grey in colour.

3. Lustre :

Activity 3

Rub rough metal with sand paper. What you see? You will see that it got shiny again. The reason for this is they all reflect light from their surfaces. Metals have special lustre which is known a metallic shine. Silver, gold, aluminium, copper etc. are all lustrous metals.

Fig. 2.2 Container made of lustrous metals

4. Hardness :

Activity 4

Try to cut an iron piece with the help of a knife. Is the iron pieces are cut easily with knife? No, because maximum metals are hard. They cannot be cut easily. All metals have difference in hardness. Sodium and potassium are easily cut like wood which shows that they are soft in texture.

5. Sonorous:

Activity 5

Take any metallic thing like steel plate, school bell, metal coin, aluminium sheet etc and strike it with any hard object. They produce a special metallic sound when stricken with any hard and strong object. This is called sonorous nature of metals. For this reason they are used as bells, instruments of music etc.

Fig. 2.3 Sonority in metals

6. Density:

Normally, the density of metals is high. Let us know.

Activity 6

Dip the substances made of metal like iron nail, steel spoon etc in a bucket fill of water. What you observe? You observe that all the substances sink in water as their density is higher than water. Some metal have low density and therefore floats on water. Example sodium (Na) and Potassium (K) etc.

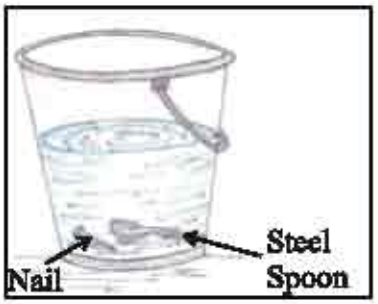

Fig. 2.4 Density of metals

7. Melting point :

That point of temperature on which any substance start melting from solid state to liquid state is called melting point of that substance. Metals have high melting points, because of their hardness. Examples are Iron (Fe) melting point – 1593° C. But Gallium (Ga) is exception to this which melts even when kept on palm because its melting point is very low.

8. Conduction of heat :

Are metals conductors of heat? Let us know.

Activity 7

Take a glass beaker and fill it half with water. Dip a steel spoon and a wooden stick in it. Now heat the beaker. After sometime touch and feel the spoon and wooden stick. What have you have you observe? You will observe that steel spoon feels hot while wooden stick do not. Therefore we can say that metals are good conductors of heat. That is why the utensils used in kitchen for cooking are

made up of iron, brass, copper or aluminium. Silver (Ag) is the best conductor of heat whereas lead (Pb) is the worst conductor of heat.

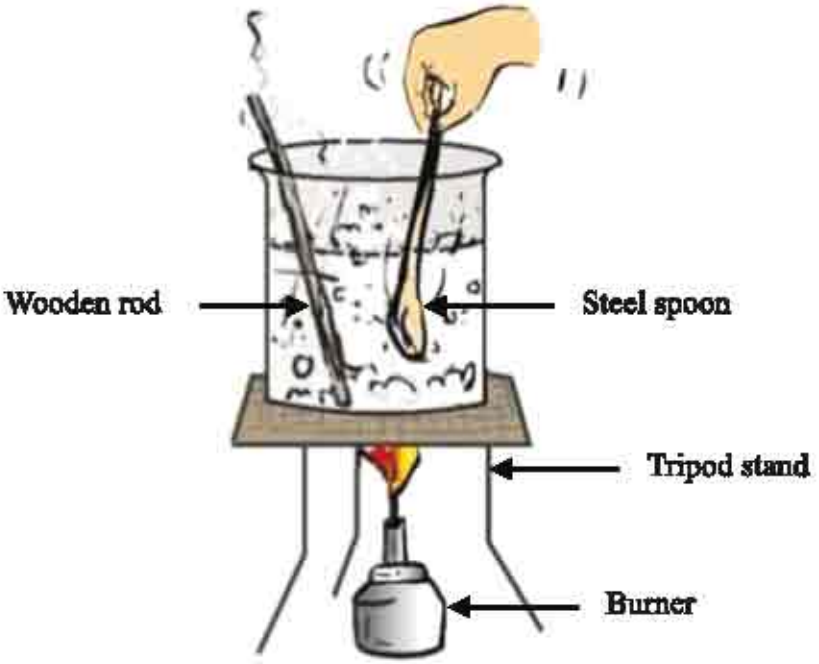

Fig. 2.5 Thermal conductivity of metals

9. Malleability:

Malleable means to be drawn into sheets and wires. Metals are malleable and drawn into sheets.

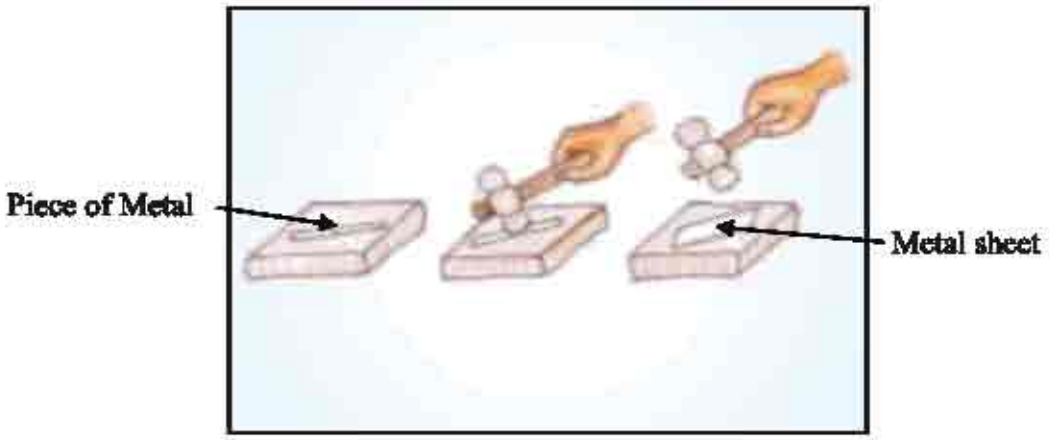

Fig. 2.6 Malleability of metals

10. Electrical conductance:

The flow of electric current from metal made them conductors of electricity. Silver has highest conductance.

Activity 8

Take a cell and connect a bulb through wires as shown in figure. When you connect the circuit the bulb starts glowing. Therefore we can say that metals are conductors of electricity.

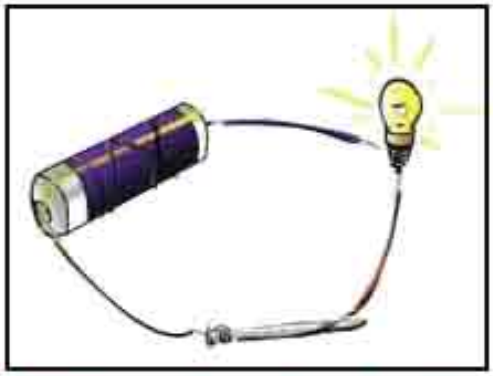

Fig. 2.7 Electrical conductivity of metals

11. Ductility:

The property of metals to be drawn into thin wires is called ductility. All metals are ductile. Those substances which are hard, have lustre, malleable, ductile, sonorous conductors of heat and electricity are called metals.

Physical properties of Non-metals:

1. Physical state:

At room temperature non-metal can be solid, liquid or gas. Example

Solid – carbon (c), Sulphur(s) ,iodine (I),

Liquid – Bromine (Br)

Gas – oxygen (O2) Nitrogen (N2) Hydrogen (H2)

2. Colour:

Non metals have different colour like sulphur yellow, chlorine gas- green yellow, phosphorous – Pink etc.

3. Lustre :

Activity 9

Take piece of coal and observe it in shade first and then in sufficient light. You will observe that it does not have any shine. Therefore, non metals are do not have shine and do not reflect light but diamond and iodine are its exceptions. They have shine.

4. Hardness :

Non metals are soft and loose in texture. Diamond is exception. It is a form of carbon.

5. Sonorous:

Non metals do not produce sound when strike with other objects.

6. Density :

They have very low density.

Activity 10 :

Take a glass beaker fill with small amount of water. Now dip a cap of pen, pencil piece, wooden block one by one in it. What you will observe? You will observe that they all float on water they have density lower than water.

7. Melting point:

Non metals have very low melting point. But graphite & dimond are form of carbon are exception of this. The alltropes of carbon exception. They have very high melting point.

8. Heat and electricity conductance:

Normally non metals are insulators and are bad conductor of heat and electricity except graphite.

9. Brittle:

Non-metals are brittle and cannot be drawn into sheets or wire.

Activity 11

Take a large piece of coal and strike with hammer. The coal gets converted into its powder. This nature of

Fig. 2.8 Brittleness of non-metals

non metals is called Brittleness.

2.3 Chemical properties of metals:

It has been seen that the utensils made of copper and aluminium loose shine after being used continuously. Even the jewellery made of silver gets blackened. Why this happens? Because metals react with water, air, acid and form other chemical compounds.

Let us we study these chemical properties in detail.

(A) Reaction of metals with air.

Metals form their oxides on reacting with air.

Metal + oxygen ⟶ Metal oxide.

Activity 12

Take a thin ribbon of Magnesium and burn in flame of candle. It burns with light and flames of white colour. Now take its ash and mix with water in a test tube. Now test with litmus paper. The litmus paper turns blue. Therefore the

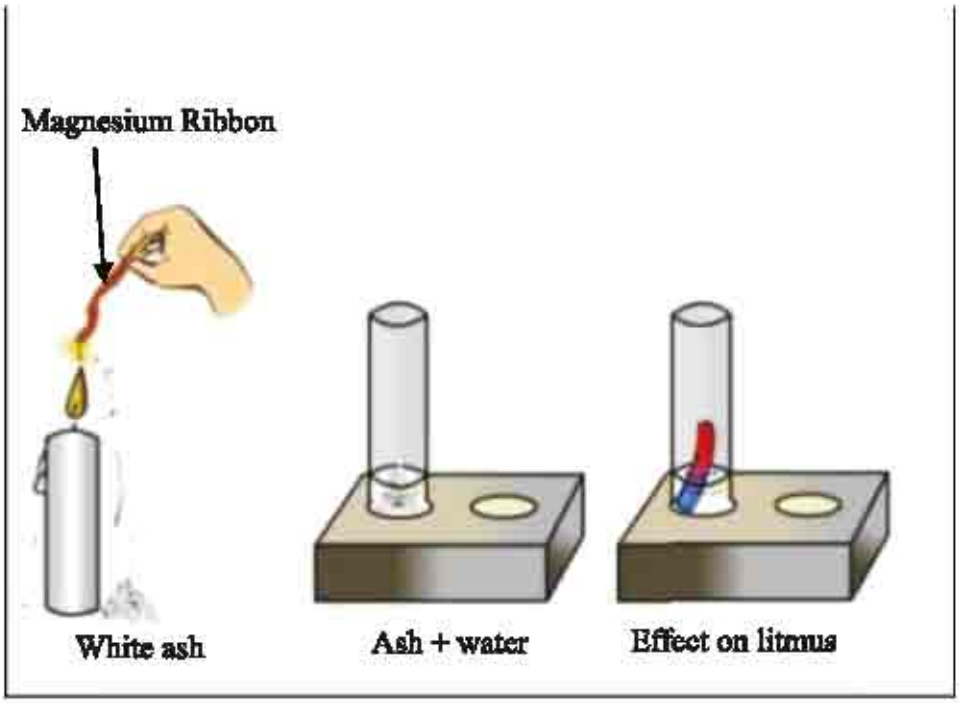

Fig. 2.9 Reaction of metal with air

oxide formed from reaction is acidic in nature.

(Do this activity with the help of your teachers).

Magnesium (Mg) + Oxygen (O_2) Magnesium oxide (MgO)

Likewise copper and aluminium also react with air and form their oxides. That's why after regular use they lose their shine.

(B) Reaction with water :

Different metals react differently with water. They form either their hydroxide or Hydrogen gas on reaction with water.

Sodium (Na) + Water (H_2O) Sodium hydroxide ($NaOH + H_2$).

Activity 13 :

This activity will be done by teachers only. Take a piece of sodium (app. Size of millet) dry on filter paper. Now dip on a beaker filled with water. It reacts with water vigorously and form NaOH and H_2 gas. Why sodium is is kept in kerosene? Sodium metal is highly reactive. It form sodium hydroxide and hydrogen gas when react with air and water. It catches fire easily. To avoid

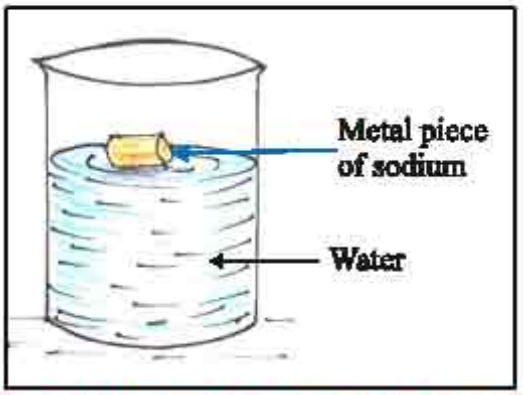

Fig. 2.10 Reaction of metal with water

Also know this

Why sodium metal is stored in kerosene oil ?

Sodium metal is highly reactive. It reacts vigorously with oxygen and water and produce sodium hydroxide and hydrogen gas. Hydrogen gas catches fire. To protect sodium from air, it is stored under kerosene.

reaction with air, sodium is kept in Kerosene.

(C) Reaction with acid:

Metal reacts with acid and gives hydrogen gas.

2.4 Chemical PROPERTIES OF non metals:

(A) Reaction with air :

Non-metals react with air and form oxides. These oxides are acidic in nature.

Activity 14

Take small quantity of powder sulphur in inflammable spoon and heat. If spoon is not available then use any metallic of bottle. When sulphur starts burning take it to a gas jar and cover it with a lid so that the gas does not come out. Now pour little water and cover it again. Now test with litmus paper. The solution is acidic. Now reaction of sulphur with air it form sulphur dioxide gas with is acid oxide of non-metal.

Sulphur (S) + Oxygen (O_2) Sulphurdioixide SO_2

(B) Reaction with water:

Non-metals do not react with water and steam. Therefore Phosphorus is kept in water for storage.

(C) Reaction with Acid :

All non-metals do not react with dilute acids. But sulphur reacts with concentrated Nitric acid (HNO_3) and form Suphur di Oxide (SO_2) and Nitric acid (NO_2) and water.

2.5 Uses of metals and non-metals in daily life

Uses of Metals

1. Metals are used in utensils used for cooking.
2. Aluminium and iron sheets are used at home roofs, to prevent from sun and rain.
3. Copper wire is used in electronic instruments, radio electric wires, Refrigerators etc.

4. Gold and silver are used in jewellery.
5. Mercury is used in thermometers.

Uses of non metals:

1. Sulphur is used in acid, Medicine and gun powder.
2. Red phosphorous is used in matchsticks, crackle and pesticides.
3. Graphite is used in electrodes.
4. Graphite is used in pencils.

2.6 Inert Metal:

Those metals which do not react with water, air, acid etc are called inert metal. Gold, silver never lose their shine due to this reason. Purity of gold is measure in Karat, 24k Gold is purest. 23 and 24 K gold has mixing of other metals.

2.7 Alloy :

Some metals do not rust like utensils made of stainless steel. Why this happens? Because these metals are mixed with other metals in small quantities.

The Jewellery weared by our mother and sisters. the utensils used air our kitchen do not have rust why? Because in these jewellery and utensils smell amount of other metals & non metals are mixed with main metals.

Stainless steel has a mixing of Chromium and Nickel and Zinc in copper and brass in fixed quantities so that they do not get rusted.

Alloy are homogeneous solid mixtures of metals or of metals and non metals. Ailloging is alone to make the parent metal stranger and to get desired properties in parent metal e.g. brass, bronze, stainless steel etc.

What have you learnt

- Metals are hard, shiny, have high density, conductors, malleable and ductile.
- Non metals can be solid, liquid, gases.
- Non metals are soft with diamond as an exception.
- Non metals are insulators of heat and energy. Graphite is an exception.
- Metal react with oxygen to form acidic oxides and form acidic hydroxides with water.
- Metals form hydrogen gas on reaction with an acid.
- Non-metals don't react with acids.
- Inert metal: Some metals are less reactive with air, water, acid and base like gold, silver and are known as inert metals.
- We can get desirable properties of any substance by mixing it with a non metal or metal or both. These mixture is called mixed metal like brass, bronze, stainless steel etc.

□□□

Exercise

Choose the correct options for the following

1. The metal which is found in liquid state at room temperatures—
   (a) Sodium (b) Magnesium
   (c) Mercury (d) Aluminium ( )
2. The non metal which is conductor of electricity
   (a) Coal (b) Graphite
   (c) Sulphur (d) Nitrogen ( )
3. Which is most reactive from the following metals
   (a) Gold (b) Sodium
   (c) Magnesium (d) Silver ( )

4. Metal form ——— on reacting with oxygen

(a) Acidic oxides (b) Basic oxides

(c) Neutral oxides (d) None ( )

Fill in the blanks:-

1. Pure gold is ——carat.
2. The reaction of metals with acid gives out ——— gas.
3. Metals are ——— of heat and electricity.
4. The oxides of non metals are generally ——— in properties.

Match column A and column B

Column A	Column B
1. Gold	a. Medicinal use
2. Sulphur	b. Jewellery
3. Mercury	c. Pencil
4. Graphite	d. Thermometer

Short answer questions:-

1. What is malleability?
2. What are mixed metals?
3. What is melting point of substance?
4. Why is graphite conductor of electricity?
5. Why lemon juice is not kept in iron containers?

Long answer questions:-

1. Why sodium metal is kept in kerosene?
2. Differentiate metals and non metals on the basis of their physical properties.
3. Write any four uses of metals.
4. Why copper wire is use for wiring at our houses? Explain.
5. Write differences in metals and non metals on the basis of their chemical properties.

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Chapter 3

Synthetic fibres and Plastics

Points to Study

3.1 Synthetic fibres
3.2 Types of synthetic fibres and their properties.
3.3 Plastics
3.4 Classification of Plastics
- Thermoplastic
- Thermosetting

3.5 Uses of Plastics.
3.6 Plastic and Environment

3.1 Synthetic fibres :

Activity 1

You always wear a uniform while going to school. Have you ever think how your uniform is made. These are formed from clothes and clothes from fibres. From where do we get these fibres? Some fibre are obtained from nature called natural fibres and some are man made through different chemical reactions and are called synthetic or artificial fibres? List the different types of fibres in table 3.1.

Table 3.1 Things made up of different fibres.

Thing	Type of fibres
Parachute	
Brush	
Curtains	
Sweaters	

Fig 3.1 Products made up of different fibers.

Synthetic fibres or artificial fibres are also called manmade fibres as they are made by humans. Examples – Nylon, rayon polyester etc.

All these synthetic fibres are polymers. What are these polymers?

Let's study –

You have seen pearl necklace in which pearl beads are attached with each other. Likewise a train has many bogies lined to form a long chain. Both are formed from small units forming a long chain. This long chain of small unit attached to each other is called polymer.

Fig.3.2 Products in the form of polymers

Polymer is a Greek word formed of Poly means many and Mer means single unit. Therefore a polymer is a long chain of repeated small unit is a chemical substance.

3.2 Types of Synthetic fibres and its properties –

(a) Rayon : Rayon is known as artificial silk also. This fibre is made by chemical reaction on cellulose which is obtained from plants. For this cellulose is first free from all waste and then mix with sodium hydroxide and carbon disulphide to form a thick liquid called viscose. This viscose is then passed through small pore sieve in dilute sulphuric acid to obtain fibre. Rayon seems like natural fibre.

This is cheaper than natural fibre and easy to weave. Cotton and rayon is mix with each other to make bed sheets and carpets.

Fig.3.3 Products of Rayon fibers

(b) Nylon: Nylon is formed from adipic acid and Hexa methylene diamine. This is complete synthetic fibre.

Fig.3.4 Various Products made up of Nylon fibers

Properties of Nylon: Nylon is strong, wrinkleless and light weighted. Its lustre is very shiny and easy to clean. Therefore it is mostly used to make clothes. Socks, tooth brush, tent, sleeping bag, curtains etc are made of nylon.

(c) Arlon : This is obtained from polymerisation of Aceto nitryl. This fibre seems like woollen fibre.

(d) Dacron: This is a polymer of ethylene glycol and terepathalic acid.


Fig.3.5 Products made up of Decron

This is also called polyester and used in making clothes.

Properties of Dacron or polyester

1) The clothes form this material does not wrinkle easily.

2) Easy to wash and dry quickly.

The rising demand of natural fibres cannot be fulfilled. Therefore the need for manufacturing artificial fibre came and it becomes popular due to their special properties. Let us study these properties.

Activity 2

Press different types of cloth in your hand. You will observe cotton cloth show wrinkle while Nylon, polyester and rayon do not.

The fibre of synthetic cloth does not contract while washing and hence not require regular ironing.


Fig.3.6 Synthetic Cloth Fig.3.7 Cotton Cloth

Let us do and experiment study the strength of man made fibres.

Activity 3

Stretch thread of different types of cloth. What you observe? You will observe that threads of nylon, rayon and polyester are difficult to stretch as compared to cotton threads. Therefore synthetic fibres are stronger and can be used for longer time.

Activity 4

Wash and dry clothes made up of nylon, polyester, terrylene and cotton fibre on a rope. You will observe that nylon, polyester and terrylene clothes dry

Fig.3.8 Clothes for drying

faster than cotton clothes. Hence we can say synthetic thread absorb less water absorbs water and dry faster. Synthetic fibres are more shiny and soft. Bugs do not damage these clothes. Use of synthetic fibre is easy and cheap. They are easy to maintain.

There are some disadvantages of synthetic fibre also.

Activity 5

Burn piece of different cloth one by one. Nylon, polyester and rayon catch fire easily. Therefore we can say that synthetic fibres catch fire easily. If somehow they catch fibre then they stick to body. They do not absorb sweat as absorbed by natural fibre. They stick to body during summer. To overcome these disadvantages now a day natural and artificial fibres are mixed together and this is called terecot.

3.3 Plastics :

Buckets, tooth brushes, containers are all mad from which material? They are all made up of plastics. What is Plastic? Small carbon molecule unit to form

higher molecular weight structures called plastics. Example–Baikelite, polyethene, Teflon, P.V.C. etc. Plastic is a type of synthetic polymer.

3.4 Classification of plastics :

On the basis of structure plastics are of two types, let us study about them.

Fig.3.9 Applications of plastics

Activity 6

Pour hot water in a plastic bucket and try to compress it. What you observe? You will observe that plastic bucket is softer than before. Now touch and press the handle of pressure cooker. What you observe? You will find that the handle is neither hot not compressed. Means plastic bucket and handle of pressure cooker is made up of two different types of plastics and shows different properties. Therefore, plastics are of two types:-

(1) Thermoplastic

(2) Thermosetting

Thermoplastic: Those plastics which easily get moulded by heating and become hard when cooled are called thermoplastic. They can be moulded in any shapes.

Example: - polythene, PVC and polystyrene etc.

Fig.3.10 Materials made-up of Thermo plastics

The container and water pipes used at homes are made from PVC. Toys, comb, bucket etc are all made up of this plastic.

Thermosetting: Those plastic which become harder on heating and do not melt are called thermosetting plastics. Once they are moulded in any shape they cannot be moulded in other. Due to cross bonding in their structure they become insoluble and can resist much heat. Bakelite is used in electric switches, handles of utensils, batteries of car etc.

Fig.3.11 Materials made-up of Thermosetting plastics

Special properties of plastic: They are insulators of heat and light, inert, resist high temperature and are light weight. It is cheaper than metals and hence it use in daily life is very popular.

3.5 Uses of plastics -

- Used in covering of electric wires, so that they become insulators.
- Handles of kitchen utensils, pressure cooker, fry pan and electric appliances like iron, electric kettle etc.
- For storage in shops and home as chemical, pickle, spices, oil, acid etc.
- Plastic pipes used for irrigation in agriculture.
- Packing of medicine, syringe, thread used in surgery are all made from plastics.
- Utensils used in microwaves are also made of plastics.
- Teflon coating on non-stick utensils is also a plastic
- Clothes of workers of fire extinguishers are coated with melamine so that they do not catch fire.

3.6 Plastic and Environment

Uses of plastics in our daily life are prevailing day to day. This is not profitable to environment as the degradation of plastic is very slow and it may even years to degrade. In spite of so many uses of plastics, they are causing very harm to our environment. They are non biodegradable.

Non-biodegradation : Those substances which cannot be degraded by natural phenomenon are non-biodegradable products. At present plastic is one of the main reasons for environmental pollutions.

The high energy is required for burning plastics and in this process poisonous gases are liberated. These gases pollute the environment. How this problem is solved? We can use plastic in a very limited quantity.

Biodegradable and non-biodegradable waste should be collected separately and thrown then they decompose.

Give some idea with the help of which you can reduce the use of plastic in our daily life.

Protect our environment free from pollution, Recycling of plastic should be done. Therefore as responsible citizens we should follow 4R principle to stop pollution of environment.

These 4 R means:

1. Reduce – reduce the use of plastic.
2. Reuse – reuse the products.
3. Recycle – recycle them
4. Recover

What have you learnt

- Synthetic fibre is higher molecules of small units.
- Synthetic fibres are type of a polymer.
- They are highly shiny and soft. Insects do not seem these clothes.
- Synthetic fibres are strong and easy to wash and care.
- Synthetic fibres are wrinkle free.
- Plastic is a polymer.
- Plastics are of two types :
  1) Thermoplastic
  2) Thermosetting
- Plastic is used in homes and market for storage of chemicals, pickles, spices, oil, and acid and in medical and agriculture.
- We should follow 4R principle to prevent our environment from pollution.
  1) Reduce
  2) Reuse
  3) Recycle
  4) Recover

Exercise

Choose the correct options:-

1. The material used for making non-stick utensils of Kitchens is.
   (a) PVC (b) Polyether
   (c) Teflon (d) Rayon ( )
2. Which of the following group is of synthetic fibres?
   (a) Nylon, Terelene, Rayon (b) compound
   (c) Acrylic Silk, wool (d) PVC, Polyether, Bakelite ( )
3. The handles of utensils are made from.
   (a) polyether (b) Nylon
   (c) PVC (d) Bakelite ( )
4. Which is not the property of plastics?
   (a) Inert (b) Durable
   (c) light weight (d) conduction of electricity ( )
5. Thermoplastics is -
   (a) Bakelite (b) Melamine
   (c) Polyether (d) None of the above ( )

Fill in the blanks:

1. Synthetic fibres are also called _____ or _____ fibres.
2. Rayon is also called _____
3. The polymerisation of acetonitryl gives _____
4. Plastic is also a type of _____

Match coulmn A with column B:

Column A		Column B	
1.	Rayon	a.	Coating of non stick
2.	Nylon	b.	Artificial fibre
3.	Thermosetting Plastic	c.	Pipes
4.	PVC	d.	Clothes

Short answer type questions:-

1. Why it is not advised to burn plastics and synthetic fibres.
2. What are thermoplastics? Explain with example.
3. Terecot is obtained by mixing two types of fibres? Name these fibres.
4. What are non-biodegradable substances?
5. What is polymerisation?

Long answer type questions:

1. Write the uses of Synthetic fibre in our daily life?
2. Explain the statement "Do not use plastics in daily life as far as possible"
3. How Synthetic fibre nylon is formed? Write it different properties.

Activity

1. Collect plastics from your home and neighbour and list them under thermosetting and thermoplastics.
2. Stick samples of different Synthetic fibres in your scrap book.

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Chapter 4

Chemical Reactions

Points to study

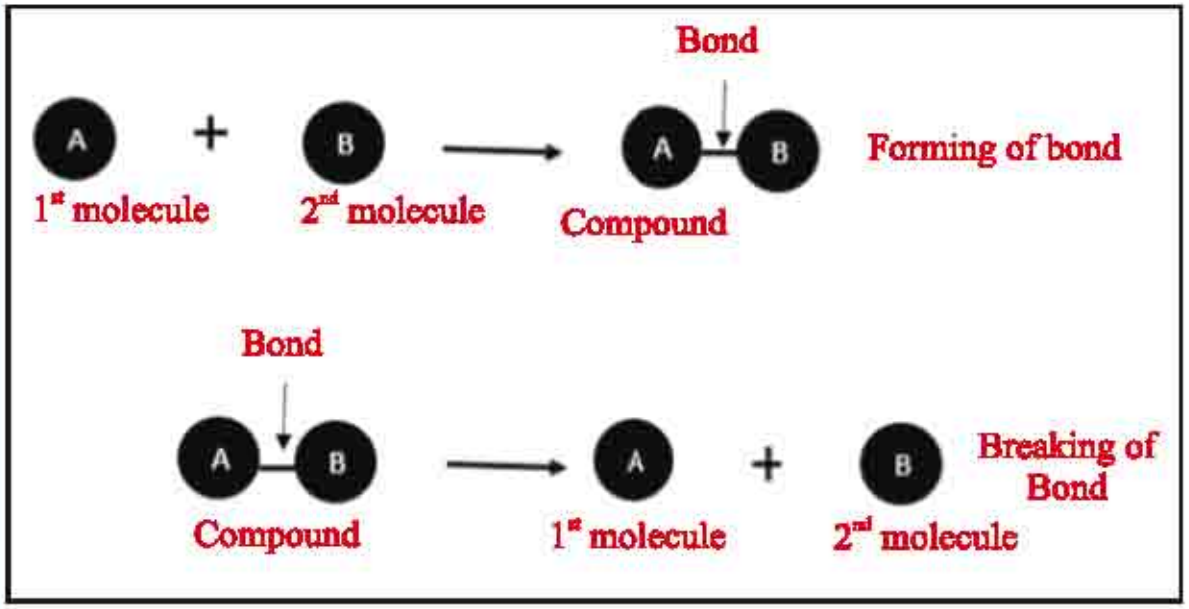
4.1 Chemical Reactions
4.2 Properties of chemical reactions
4.3 Types of chemical reactions

4.1 Chemical reactions

We see many changes around us in daily life like synthesis of food by plants, digestion of food in our body, bubbling of soda water on squeezing lemon juice, darkening of apple, rusting of iron bubbling in lime water, colour of heena etc. Why this happens?

All this happens due to activity of chemical reactions. What is chemical reaction? Let us learn

The process in which substances changes their chemical composition and properties are known as chemical reaction. The substances which are reacting together are called reactants while which are formed through their reaction is called products.



During chemical reactions the chemical bonding between substances is either form or break.

Activity 1

Take sulphur powder in a china dish. Heat it with small amount of iron dust. What you will observe? You will observe that sulphur and iron react with each other and form a new compound called iron sulphide.

$$\text{Iron} + \text{Sulfer} \xrightarrow{\text{heat}} \text{Iron Sulphide}$$

Fig 4.1 Chemical reaction

While writing a chemical reaction we write reactants on the left of arrow (→) and products on the right side.chemical reactions are of various types.

4.2 Properties of Chemical Reactions :

What will happen when we leave iron roti tawa in open and humid environment? Iron of tawa reacts with oxygen present in air in the presence of water and form iron oxide (rust).This is also a type of chemical reaction.

Chemical reactions have some specific properties. On the basis of their properties we can identify the changes .What are these properties?

Let us learn.

Note -: Do all activities in the presence of your teacher.

1. Production of Gas :

Fuels like petrol, diesel, kerosene etc. when burn react with air and form carbon dioxide gas. Likewise when we burn coal carbon dioxide is produce.

$$C + O_2 \longrightarrow CO_2 (Gas)$$

Activity 2

Take zinc granules in a test tube. Now add dilute sulphuric acid gently in the test tube. A gas is liberated which burn with explosion when we bring burning match stick near the mouth of test tube. This gas is hydrogen.

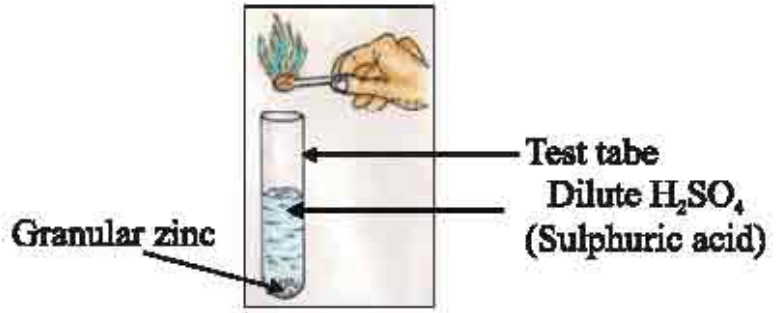


Fig. 4.2 Burning of hydrogen gas with blue flame

2. Change in colour :

when we kept a half cutter apple in air it colour changes to brown as the iron present in apple react with oxygen present in environment and form iron oxide.

3. Heat changes:

when we add ammonium chloride in water .it cools down.

4. Precipitation:

soap precipitate in salty water in spite of forming froth like in fresh water. On the basis of above given properties, we can say that chemical reactions are of various types.

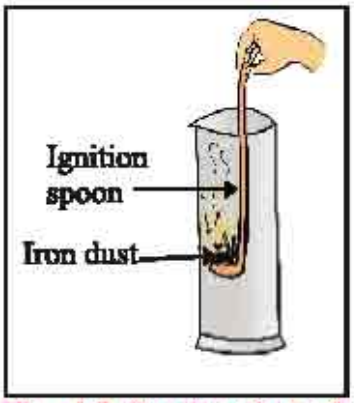


Fig. 4.3 Combustion of iron powder

4.3 Types of chemical reactions:

1. Addition reactions:

Activity 3

Take iron dust in an ignition spoon. Heat it till red hot. Now take this spoon in a gas jar filled with oxygen.

Iron dust burn with sparkling flames and form ferric oxide.

$$Fe \text{ (iron dust)} + O_2 \text{ (oxygen)} \rightarrow Fe_3O_4 \text{ (ferric oxide)}$$

When two or more elements or compounds reacts to form new compounds (products), this reaction is called Addition Reaction.

2. Dissociation or Decomposition reaction:

Activity 4

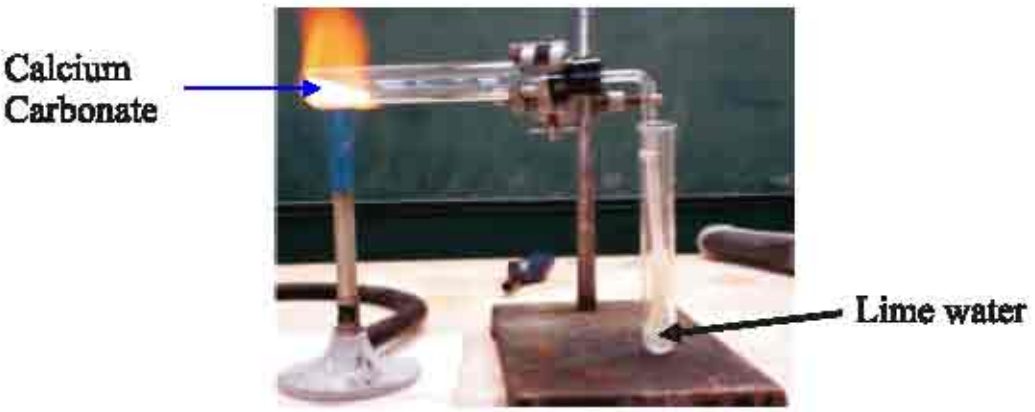


Fig. 4.4 Dissociation of calcium carbonate

$$\text{Calcium Carbonate } (CaCO_3) \xrightarrow{\text{Heat}} \text{Calcium Oxide } (CaO) + \text{Carbon di oxide } (CO_2) \uparrow$$

Heat calcium carbonate. When it gets heated a gas starts liberating from it. Now take this to lime water, which get milky white when exposed to this gas. This gas is carbon dioxide. When we heat calcium carbonate, calcium oxide and carbon dioxide are formed.

The reaction in which reactant breaks in two or more products are called decomposition or dissociation reactions.

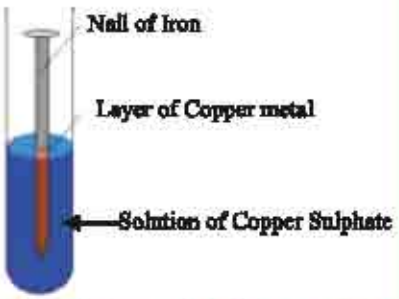


Fig. 4.5 Displacement of Copper on Iron

3. Displacement reaction:

Activity 5

make a solution of copper sulphate in a test tube. Now add non rusted iron nail in this test tube. Leave them for some time.

After some time iron nail has deposition of light brown colour. This layer is of copper metal. The colour of solution also changes to green from blue. The copper of copper sulphate get deposited on iron nail. Here more reactive metal displace less reactive metal. Iron is more reactive than copper (cu) and hence displace copper (cu) and form iron sulphate.

$$\underset{\text{(Iron)}}{Fe} + \underset{\text{(Copper sulphate)}}{CuSO_4} \longrightarrow \underset{\text{(Ferrous sulphate)}}{FeSO_4} + Cu$$

> The reaction in which more reactive compound displace less reactive is called displacement reaction.

4. Oxidation Reaction :

Activity 6

Take copper powder in a test tube and heat. After some time you will observe a blackish layer on the surface of copper sulphate powder. This layer is of copper oxide, which is formed by the reaction of copper and oxygen.

$$\underset{\text{(Copper)}}{Cu} + \underset{\text{(Oxygen)}}{O_2} \longrightarrow \underset{\text{(Copper Oxide)}}{CuO}$$

Fig. 4.6 Oxidation Reaction

In this reaction copper is oxidised to copper oxide

$$\underset{\text{(Methane)}}{CH_4} \xrightarrow[600°C]{\text{Heat}} \underset{\text{(Carbon)}}{C} + \underset{\text{(Hydrogen)}}{2H_2}$$

The reaction in which oxygen is consumed and hydrogen is liberated are called oxidation reaction

Reduction reaction :-

$$\underset{\text{Copper oxcide}}{CuO} + \underset{\text{Hydrogen}}{H_2} \longrightarrow \underset{\text{Copper}}{Cu} + \underset{\text{Water}}{H_2O}$$

(Oxygen is liberated)

When hydrogen gas is react with hot copper oxide copper and water are formed.

H_2(Hydrogen gas) + Cl_2(Clorine gas) ⟶ HCl(Hydrocloric acid)

The reactions in which any substance oxygen is liberated and hydrogen is consumed are called reduction reaction.

Oxidation and reduction reactions are opposites of each other and never take place independently. They take place always together. When in a reaction one substance get oxidised the other get reduced.

The reactions in which oxidation and reduction take place together are called redox reaction or oxy - reduction reaction.

5. Neutralization Reaction :

$$\underset{\substack{\text{(Hydro cholric Acid)}\\\text{(Acid)}}}{HCl} + \underset{\substack{\text{(Sodium hydroxide)}\\\text{(Base)}}}{NaOH} \longrightarrow \underset{\substack{\text{(Sodium cholride)}\\\text{(Salt)}}}{NaCl} + \underset{\text{(Water)}}{H_2O} + \text{energy}$$

Acid and base reacts together to form salt and water.

The reaction in which acid (HCl) and base (NaOH) react together ,they form salt (NaCl) and water are called Neutralization reaction.

6. Endothermic and Exothermic reaction:-

Activity 7

Take a glass beaker and add little waterinto it. Note the temperature with the help of thermometer. Now add powder of potassium nitrate to it. Stir and again note the temperature. You notice a change in temperature.

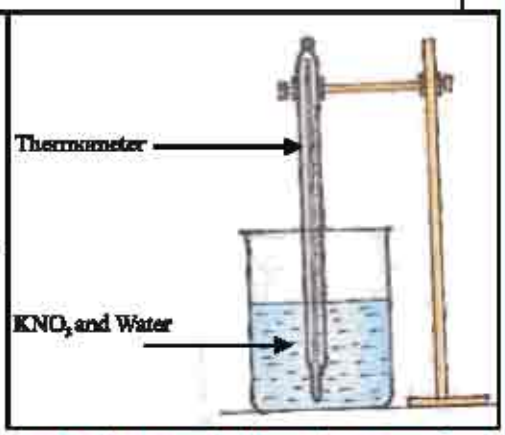


Fig. 4.7 Endothermic Reaction

The reason for decrease in temperature is

absorption of heat during reaction. The reaction in which heat is absorbed are called endothermic reaction.

Repeat the above experiment with sodium hydroxide

We notice a rise in temperature this time. The reason is energy get liberated during reaction. The reactions in which energy is evolved are called exothermic reaction.

What have you learnt

- The change in any substance due to chemical activity is called Chemical Reaction.
- State change, evolution of gas, change in color, change in heat, Precipitation etc. are the properties of chemical reactions.
- When two or more elements or compounds react together and form a product, the reaction is called addition reaction.
- The reaction in which reactant breaks and form two or more products it is called decomposition reaction.
- The reaction in which less reactive element is replaced by more reaction element is replaced by more reaction is called displacement reaction.
- Oxidation and Reduction reaction take place simultaneously.
- Acid and base in fixed quantities react to make salt, water and energy. These reactions are neutralization reaction.
- The reaction in which energy is absorbed is endothermic reaction.
- The reaction in which energy is liberated is called exothermic reactions.

Exercise

Choose the correct options:

1. The following is an example of which type of reaction.
   $NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$
   (a) Addition (b) Displacement
   (c) Decomposition (d) Neutralisation ( )
2. In oxidation reaction.
   (a) Oxygen is Added (b) Hydrogen is added
   (c) Oxygen is removed (d) Hydrogen is removed ( )
3. Acid change blue litmus to.
   (a) White (b) Red
   (c) Black (d) Purple ( )
4. Copper (Cu) + Oxygen (O_2) →
   (a) H_2O (b) O_2
   (c) Cu O (d) $CuSO_4$ ( )

Fill in the blanks:

1. Dissociation reaction is opposite of _____ reaction.
2. On adding fixed volume of acid and bases _____ and _____ are obtained.
3. Addition of oxygen is known as _____
4. The reaction in which energy is liberated is called _____

Match the following columns:

	Columns: 1	Column : 2
1.	Salt and water are formed from acid and base	Oxidation
2.	Liberation of oxygen	Neutralization
3.	Liberation of energy	Reduction
4.	Removal of hydrogen	Exothermic

Short answer type questions:-

1. Write an example of displacement reaction.
2. Why lime water milky when carbon dioxide gas pass through it?
3. Explain addition reaction with example.
4. Explain displacement reaction with example.
5. Write properties of chemical Reaction.

Long answer type questions:

1. How many types of chemical reactions are there? Explain any four with example.
2. Example with experiment any two properties of chemical reaction.
3. Explain with example.
   (a) Neutralization reaction.
   (b) Dissociation reaction.
   (c) Exothermic reaction.
   (d) Endothermic reaction.

Activity work

Take a plastic bottle and make two holes at the bottom of it. Put two carbon rods in these holes and seal them with wax. Fill the bottle with water. Cover the rods with test tubes. New connect both rods with a cell and observe carefully. This is a typical water voltameter. When current flows oxygen on positive electrode and hydrogen on negative electrode get deposited. We see it by observing bubbles on these rods. Like this we can separate H_2 and O_2 of water CH_2O

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Chapter 5

Biodiversity

Points To Study:

5.1 What is biodiversity?
5.2 Degradation of biodiversity
5.3 Conservation of biodivesity
- Wildlife sanctuary
- National park
- Zoological park
- Botanical garden

5.4 Biodiversity Hot Spots

5.1 What is biodiversity?

Different types of innumerable animals, plants and organisms are found on the earth. Organisms found in different habitats and environment have different nature and different structural organisms. Our ancient literature has also mentioned about the geographical nature of India.

Uttaryatsmundrasya himadreschaiv dakshinam
Arsha tadbharatah naam bharti yatra santati.

(That means between the north of Indian ocean and south of Himalayan range, the land area is called India.)

The environmental and climatic conditions of our country greatly vary from Jammu and Kashmir in the north to Kanyakumari in the south. Because of different climatic conditions, people living in different geographical areas have different culture, dressing, eating habits etc.

Do the environment also affects the species of animals, plants and microorganisms of that area?

Yes, the environment also affects the spieces of animals, plants and microorganisms of that area?

Let us list the animals and plants found in our near by area in the table 5.1.

Table 5.1 Plants and animal found in our near by area.

Name of plants	Name of animals

From the above table we can conclude that different types of animals and plants of different species are in our near by area. These animals and plants are the specificity of our area. Thus the spieces of plants and animals found in a particular area is called the biodiversity of that area.

Are the species of animals, plants and microorganisms found in whole India are similar?

Let us try to find out:-

Due to the diversity of environmental conditions of different geographical areas, the species of animals and plants found in these areas are also different. . In whole world, there about 2,50,000 plant species, out of which 45,000 species are found in India only. This diversity in animals, plants and microorganisms in India is comparatively more than the other countries. Thus India is called a bio diversity rich nation.

Do you know about such animals and plants?

1) Which you have studied in science books or those which are conserved in plant and animal museums but are not found in natural or artificial protected areas.
2) Which are not found in natural habitats but are in protected areas.
3) Those which, if not conserved timely, can extinct because of their decreasing number.
4) Which are found exclusively in a particular area.

The above mentioned four types of animal and plant species are categorised by International Union for Conservation of Nature (IUCN)) in following classes:

I) Extinct species ii) Extinct in natural habitat

iii) Endangered species iv) Endemic species

I) Extinct species : These are the plants and animals species which have been lost forever, none of the representative is alive today. Example:

Animal species: Dodo bird, wild pigeon, Woolly mammoth, Tasmanian Tiger

Plant species: Saint Helena olive, woods cycades, Kokia koki.

Fig 5.1 Dodo bird

Fig 5.2 Woods Cycads

ii)Extinct in natural habitat : These are plants and animals species which are no longer found in their natural habitats but their representative members are still living in artificial habitats. like :

Animal species: Hawaii crow, Vyoming frog, Black soft coated tortoise

Fig 5.3 Hawaii Crow

Plant species: Kalimantan mango (Kasturi)

iii)Endangered species: The species of plants & animals whose number have been reduced to a critical stage & they may become extint in near future. If their timely consersation efforts are not taken. Example:

Animal species : Asiatic lion, Dolphins of Ganga, Black buck, One horned Rhino, Desert lizard, Godawan,

Plant species: Paneerbandh, Rohida, Indrok, Guggal, Fog

Asiatic Lion

Krishna buck

Leopard

Godawan

Son Chirraiya

Vulture

Paneer Bandh

Rohida

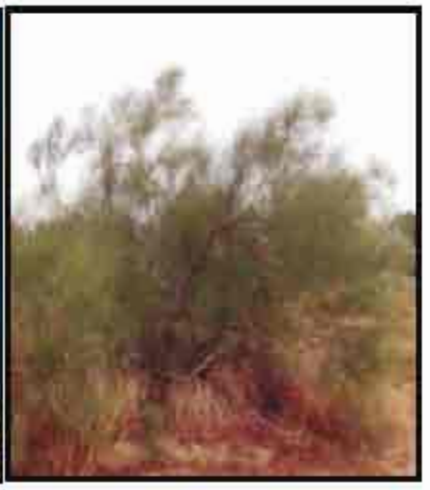

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Fig 5.4 Endangered species

iv) Endemic species : These are the animals and plants species that are found exclusively in a particular area called as endremic species. They are not found in any other area in their natural from. In the Panchmarhi biosphere reserved area Sal and wild mango are endemic plants and Indian giant squirrel and flying squirrel are the endemic animals of that area. Other examples are:

Animal species: Snow Leopard (Himalayan range),Gangetic Dolphins of River Ganga (Ganga river)

Plant species : Indrok, Penpa, Khedula, Su-Fog (Rajasthan), Red Sandal (South western Ghats)

Gangetic Dolphin

Snow Leopard

Su-phog(Ephedra)

Indrok

Fig 5.5 Endemic Species

Let us categorise all the examples according their classes in the Table 5.2

Table 5.2

Sr. No.	Name of class	Animal species	Plant species
1.	Extinct		
2.	Extinct in natural habitat		
3.	Endangered		
4.	Endemic		

Observe the above table and try to find out which plants and animals species are in more than one class.

5.2 Degradation of biodiversity

We generally came to know through news media on special days like World Environment Day, Earth day etc, that there is a fall in biodiversity on the earth.

Have you ever wondered why there is such a fall in bio diversity? Come let us find out.

You might have seen a tree in a near by area. How many organisms are dependent on that tree. How many birds live on that tree? Try to find out.

Now just imagine if this tree has been cut down?

On cutting down the tree, habitats of all animals and birds dependent on it will be lost. Along with that, small insects which are not visible to us but are of importance to us will also get destroyed. Among all those organisms which are destroyed, some organisms are such that they have habitat only on specific trees. Thus cutting down of specific trees result in decrease in number of their dependent organisms and in near future they will reach to an extinction. This loss of biodiversity is called biodiversity degradation.

Let us study the causes of biodiversityv degradation.

Degradation of Biodiversity: in last 200 years, many of the animal and plant species have been extinct and many are at border of extinction. The existence of plants and animals on earth is due to their interrelationship and inter-dependence. Biodiversity is essential for for the existence of organisms. Biodiversity degradation is an important environmental issue. Main causes of biodiversity degradation are as follows:

Deforestation :

Clearing of forests due to man made or natural causes is called deforestation. Main causes of deforestation are:

- Wood is required for fuel, furniture, structural work, paper, decorative woodden items, ships etc. For this wood, forests are being cut down recklessly and in uncontrolled manner.
- Overgrazing by animals is also a main cause of deforestation.
- Fast growing population and urbanization is also a cause of forest destruction. To support the growing population with food grains, forests are cut down to make agricultural land. Apart from these forests are also being cut down for roads, railway tracks, dams, buildings, factories etc.

Hunting of animals and birds-

- Many animals are hunted for their teeth, meat, skin, horn, bones etc. Due to reckless hunting many species of plants and animals are near extinction.

Harmful effects of deforestation

Deforestation causes following harm effects on biodiversity

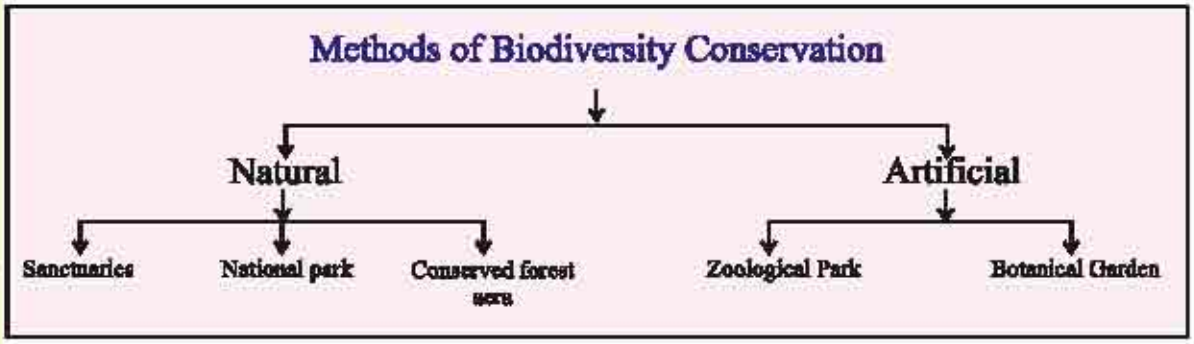
- Roots of plants and trees bind the soil firmly. Due to cutting of trees, soil becomes loose and is flown away due to strong winds or waterflow. The upper layer of soil in rich in humus and nutrients. Due to its flow away, the fertility of soil decreases which causes harm effects on vegetation.
- For various species of animals, birds and plants, forest is the best natural habitat. With deforestation, their habitats are also destroyed.
- We know that plants take carbon-dioxide (CO_2) and releases oxygen (O_2) during photosynthesis. Due to deforestation, the balance of these gases in atmosphere is getting disturbed. Due to increasing amount of carbon-dioxide in atmosphere, world's temperature is rising which is called Global warming.
- Trees absorb water from the soil through their roots and this water is released in the air as water vapours by the process of transpiration. Due to deforestration, the amount of water vapour is continously decreasing in the atmosphere which results in less rainfall.
- Due to decreasing vegetation in the hilly areas, the capablity of soil to bind firmly is being lost,this has lead to increasing incidenses of land slides like-disaster in Uttrakhand.

- Plants animals are also adversely affected by air, water soil pollution.
- Environment is changing greatly due to the natural or man made causes. The species which do not get adapted to this changed environment are becoming rare or extinct.
- Natural disasters like earthquakes, drought floods, cyclone etc are also causes of extinction of many species of plants & animals..

5.3 Conservation of biodiversity

Let us think how we can conserve biodiversity-

We can use following processes to conserve biodiversity:



Conservation of biodiversity- It is our responsibility for conservation of this biodiversity. We have to conserve our degrading biodiversity using above mentioned methods and by bringing awareness in the society.

Many national and international organizations are working for protection of forests and wildlife.

Our central and state governments have also formulated many laws, regulations and policies for their protection and conservation. We should follow the rules, laws and policies made by our government to protect environment and biodiversity and we should also inspire others to do the same. Wildlife sanctuaries, National Parks, Zoological Parks, Botanical gardens etc. are the protected areas for plants and wild animals established by central and state government.

Wildlife Sanctuary and National Parks

Many wildlife sanctuaries and National Parks are being established in many countries of the world to conserve some important species of animals, plants and birds in their natural habitats. In our country we have more than 510 wild life sanctuaries and 102 national parks. Cutting of trees and hunting animals are prohibited in these areas. Some of the wildlife sanctuaries and national parks are as follows: Bandhavgarh in M.P.(tiger), Bandipur in Karnataka (Tiger), Gir in Gujarat (Asiatic Lion), Kaziranga in Assam(Indian Rhino), Kanha in M.P.

(Tiger), Periyar in Kerela (Asiatic elephant), Dachigum in Kashmir (Kashmir Stag), Keoladeo National park in Bharatpur(Siberian crane), Ranthambore in Rajasthan (tiger), Sunderban (Tiger). Rajasthan has 30 wildlife sanctuaries, 4 National parks and 4 restricted areas.

Zoological park or Protected Area

Zoo is a place where animals and plants are Exhibited for general public to give information & spread awareness about wildlife. These are also working as the breeding centres for the animals which are extinct in wild. Their main objective is to create awareness among the people about environment conservation and to produce a zeal of love and care of wild life attached with the animals.

Fig 5.6 Ranthambhore National park

Fig. 5.7Gir national park

Botanical Gardens

These are established for conservation of plants species which are extinct in wild species and endangered species. There are about 1600 botanical gardens in the world. These are established as seed banks and conservation of vegetation. In India, Acharya Jagdish Chandra Bose Indian botanical Garden is in Sibpur, Howrah, West Bengal. It is spread in about 269 acres of land.

Migration places of : To avoid adverse environmental condition of thier native places, many species of exotic birds in their breeding season fly for long distances & visit India which has varied climatic condition. These are called Migratory birds.

Example: Siberian Crane.

Fig 5.8 Herd of migratory birds

Their important visiting sites in Rajasthan are:

1. Khichan near Faulodi, Jodhpur.
2. Keoladeo National park Ghana, Bharatpur.
3. Near Guda Bishnoiyan, Kakani pond, Jodhpur.
4. Talchapar, Churu.
5. Deedwana, Nagaur.

5.4 Biodiversity Hot Spots

The bio geographical reagions which are very with rich in biodiversity and habitats of various endemic species, but whose biodiversity is degraded due to selfish human interest are called biodiversity hot spots (Norman Mayres, 1988). These biodiversity hot spots include endangered, threatened and endemic plants and animal species. There are 34 Biodiversity Hot Spots, out of which two are in India. They are Western Ghats and Eastern Himalyan area. Due to fast deforestation, species found in these hot spots are in danger and it is necessary to save them.

Plants are the only living organism on the earth which can convert the solar energy into chemical energy used in food substances. That is why it is writly said in

Yavad bhumandal dhate ssailvan kananam
Tavat tishthti mediyanam santati putra pautriki

(Durga Saptshati)

(This means that as long as our earth is prosperous with forests including trees and mountains, it will nourish human generations).

We should work for conservation for our rare biodiversity.

Recycling Paper

Do you know that to obtain 1 ton of paper, 17 big trees have to be cut down. Thus we should save paper and use it wisely. By recycling paper we can not only save trees but can also save water and energy used to produce paper.

Red Data book: It is a book in which records of all endangered species are kept. There are separate Red Data books for plants, animals and other species.

Also have a look:

Biodiversity of cows in Rajasthan :

1. **Kankrej:** This breed is found in Barmer, Pali and Sanchore and Naigad areas of Jalore. They have average length, strong body, broad chest, and straight back, forehead is broad and slightly dished in the centre, the horns are lyre shaped, ears are large and pedulous shaped, nose slightly upturned and a shorter tail some of its characteristic features. Due to its fast walk and capability to bear weight, it is liked by the farmers.
2. **Malvi :** These are famous as load bearers. Found in malvi area of Jhalawar, their body is well built and are grey coloured. As the age of male increases, the colour darkens. This breed has two types: (a) Big Malvi and (b) Small malvi. Big Malvi is found in Jhalawar and small Malvi is found in Kota and Udaipur districts. The back is straight but tghe hindquarters are drooping. The legs are powerful but short. The dwelap is well developed and the sheath is moderately pendulous. The head is short and broad with dished forehead. The muzzle is broad dark coloured and slightly upturned. the horns, which emerge from the outer angles of the poll in an outward and upward direction, are strong and pointed. The ears are short and pointed and not drooping. the tail is of moderate length with black switch reaching to about the fetlock.
3. **Rathi :** These cows give milk in more quantity. These are the hybrid variety of Sahiwal, Red Sindhi and Haryana breeds. The breed is almond coloured or sometimes spotted also. This breed is one of the best breed of cows in Rajasthan. These cows give milk about 25 to 30 pounds. Their tail is long and stomach is large. Their bulls are heavy in weight.
4. **Nagori :** the Nagori bulls are active and are famous for ploughing. Solahak area of Nagore is considered as their native place of origin. Long, deep and powerful frames, flat forehead, large and pedulous ears, moderate sized horns, fine and slightly loose skin, moderately length tail reaching just below the hocks and terminating in a tuft of black hairs, muscular and powerful shoulders and forearms are some of their characteristic features.

Breeds of Tharparkar and Gir varieties are also found in our area.

What have you learnt

- The plants and animals species found in a particular area are called the biodiversity of that area.
- Those species of plants and animals whose any representative is no longer alive are called extinct species.
- Organisms whose count is decreasing below a certain limit and are at the margin of extinction are called Endangered animals.
- Animals and plants species which are found exclusively in a particular area are called Endemic species.
- The main causes of deforestation are reckless and uncontrolled cutting down of trees for wood, overgrazing by the animals, over growing population and urbanisation.
- Due to increasing carbon dioxide in atmosphere, the temperature of the earth is increasing. This is called global warming.
- Wildlife sanctuary, parks, zoo, Botanical gardens are conserved and protected areas for the plants and animals species.
- Red Data book has the record of all the endangered species. There are separate Red Data books for plants, animals and other species.

□□□

EXERCISES

Mark the correct option

1. The species which is not found in natural habitat but is present in conserved area is called

(a) Endangered (b) Extinct

(c) Extinct in natural habitat (d) Endemic ( )

2. Which of the following is Endangered species:

(a) Neem (b) Khejdi

(c) Indrok (d) Ber ( )

Fill in the blanks

1. Record of all the Endangered Species are kept in _____
2. Those plants and animals species whose any representative member is no longer alive is called _____
3. The plants and animals species which are found exclusively in a particular area are called _____ to that area.
4. There are _____ biodiversity hotspots in the whole world.

Short answer type questions

1. Which are the conserved and protected areas for the plants and animals?
2. What is the Red Data book?
3. What are the biodiversity Hot Spots?
4. Why the Botanical gardens were established?

Long answer type questions

1. What are the causes and harmful effects of Deforestation? Write a note.
2. What efforts have been taken for biodiversity conservation? Write in detail.

Activity

1. Study the biodiversity of forests and sanctuary of your district. Make an elaborated report which having photrographs and diagrams of their vegetation and animals.
2. With the help of your elders, parents and teachers, find out which plants and animals were once found in your near by areas but now are extinct, or which are now very less in number. Make a list.
3. Make a table of Sanctuaries, their districts' name, and conserved animals of Rajasthan on a chart.
4. Find out the Endangered Bio species, and participate in the social work, and other projects related for their conservation.

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Chapter 6

Reproduction in Plants

Points to Study:

6.1 Reproduction and its types
6.2 Pollination
6.3 Fertilization
6.4 Heredity

6.1 Reproduction and its types

You must have eaten mango from a mango tree, guava from a guava tree and ripened fruit of a neem tree. After eating mango you might have sown its seed in the soil and tried to take care of it.

In your surrounding, you might have observed a neem tree growing from neem seed , a maize plant developing from maize seed and similarly a goat giving birth to a kid and a cow giving birth to a calf.

Have you ever wondered that :

- Why onlyneem plants develop under a neem tree?
- Why a goat gives birth to on of its kind?
- Why do this happen?
- If this doesn't happen, then what will happen?

Every organism, whether a plant or an animal, who has taken birth on this earth, has to die. So to maintain the continuity of its species, every living being produces an offspring of its type. The process to produce offspring of its own type is called Reproduction. This process goes on from generation after generation so as to maintain the continuity of their species.

Types of reproduction in plants are as follows:

1. Vegetative reproduction
2. Asexual reproduction
3. Sexual Reproduction
4. Parthenogenesis

1. Vegetative reproduction

Activity 1

Take a potato and observe it carefully. In its grooves, there are some outgrowths called the 'eyes of potato'. Cut the potato into parts, containing these

eyes, and sow these parts in the pits dug in the soil. Cover the pits with soil and water it regularly. After a few days take out these potato pieces by digging the soil.

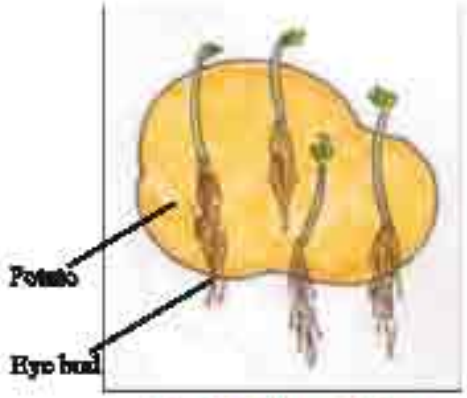

Fig 6.1 Vegetative reproduction in Potato

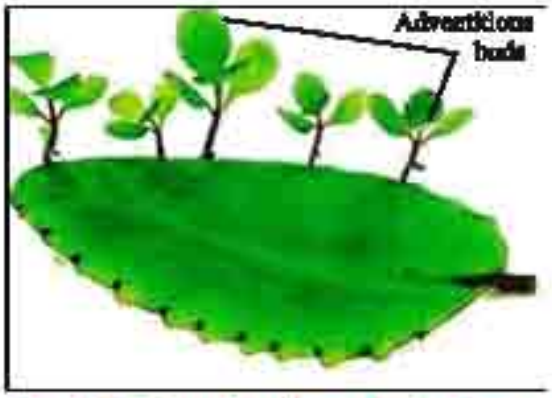

Fig 6.2 Germinating plants from Bryophyllum leaves

Observation : New plants germinating from the eyes are observed.

The process of development of a new plant from any vegetative part of a plant other than the seed is called vegetative reproduction . The plants developed by vegetative reproduction are identical to their parent plant. These are called **Clones.** Example: potato, grass, onion, colocasia ginger, jasmine etc.

Similarly, buds are present in the grooves of Bryophyllum (Phathurchata) leaves. The leaves containing these buds, when fell onto the moist soil, each bud develops into a new plant. In Cactus, the stem when separated from plant, gives rise to a new plant and in Dahlia, the roots give rise to a new plant.

Activity - 2

Cut a branch of Rose plant at its node. Node is that part of the plant from where the leaves arises.10-12 cm long this part of stem is called stock. Cut it in a slanting manner, grow it in soil and water it regularly.

Observation

- How many days does it take for new branches to appear?

This will gradually develop into a new plant.

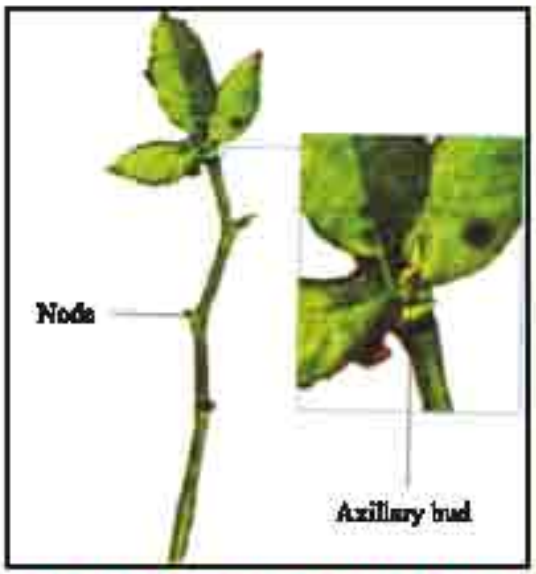

Fig.6.3 Germinating stem of rose

Benefits of vegetative reproduction :

1. Plants develop in lesser time.
2. Flowers and fruits are obtained in lesser time.
3. The new plants are obtained from a single parent.
4. Parental characters are conserved as the plants grown are genetically identical.

2. Asexual reproduction

In this process a single parent is involved. In this type of reproduction, there is no fusion of gametes and the chromosomal number remains constant. Asexual reproduction takes place by following processes.

Budding

Activity - 3

Bring yeast powder or yeast cake from your near by bakery shop. Add a pinch of yeast in a bowl containing water. Add 1 teaspoon full of sugar and mix. Now keep this bowl in a warm place.

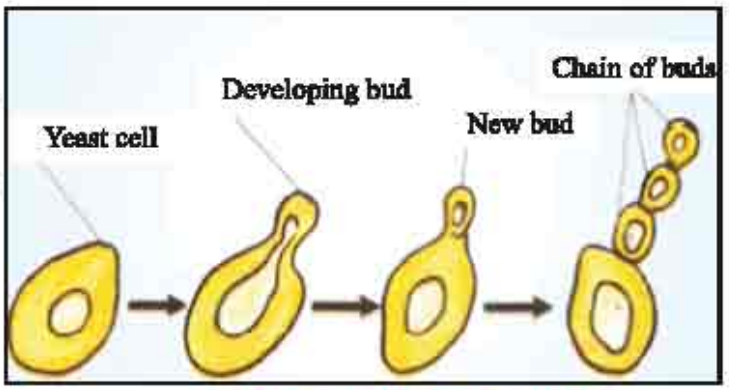

Fig 6.4 Budding in yeast

Observation : After an hour, take a drop of this liquid on a glass slide and observe under a microscope. You will see new yeast cells as shown in fig 6.4. Buds are formed in yeast cells as a small bulb. Gradually the bud grows and when it gets separated from the parent, new yeast cells are formed.

Fragmentation

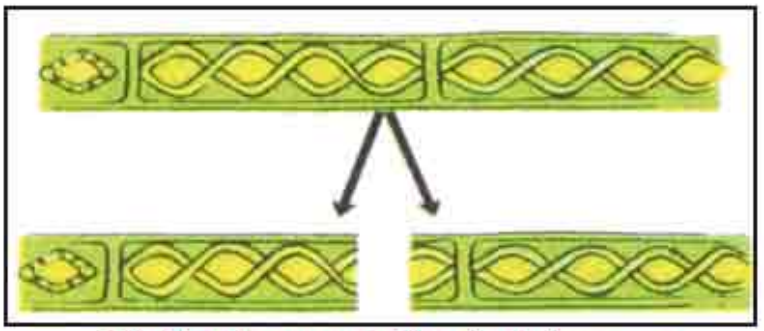

Fig 6.5 Fragmentation in Spirogyra

You might have observed a green slippery growth in ponds or stagnant water. These are called algae. In favourable conditions, algae grow speadily by fragmentation and each fragment forms a new alga. Example: Spirogyra

Spore Formation : If pieces of bread are kept in moist place, then after sometime cotton like fungal growth is seen.

In this cotton like fungi, black and brown coloured sporangia containing spores are seen. When these spores are released, in air, being light in weight, they are spread at far away places. Each spore at unfavourable conditions, like high temperature and low moisture, makes a hard coating around itself. In favourable conditions the spores germinate and forms new fungal filaments (Hyphae). Example: Mucor, Rhizopus

This type of reproduction takes place generally in lower groups of organisms like algae, fungi, moss and fern.

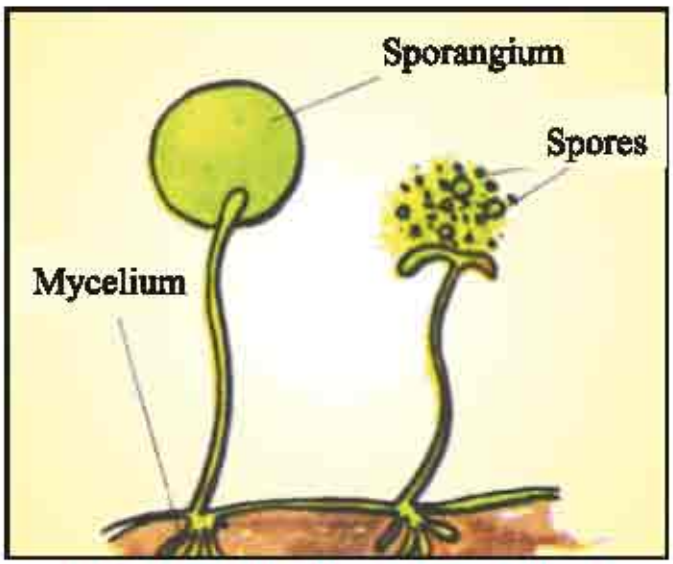

Fig. 6.6 Spore formation in Mucor

3. Sexual Reproduction

Activity 4

Take a Dhatura flower. Try to identify its different structures. Paste it on a different parts on a chart sheet and try to label them with the help of your teacher. The outermost whorl, made up of green leaf like structures is called calyx and its each member is called sepal. Inside calyx is a another beautiful whorl of white leaves which is called corolla. Each member is called a petal. Both of these whorls are called accessory whorls. They help the flower in reproduction process. Observe the flower and fill in the following table.

Table 6.1 Description about various parts of Dhatura flower.

Sr. No.	Name of structure	Number	Colour	Function
1.	Calyx			
2.	Corolla			
3.	Androceium			
4.	Gynoceium			

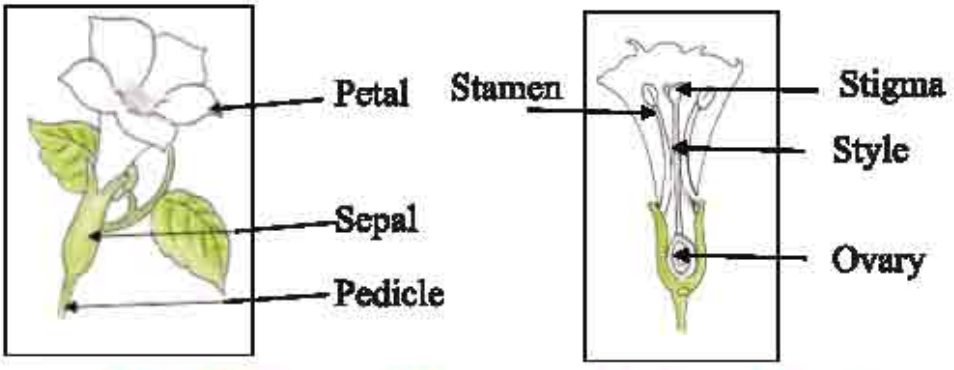

Fig 6.7 Flower of Dhatura and its internal section

Inside the corolla, is present the reroductive parts of a flower. Androecium is the male reproductive organ while gynoecium is the female reproductive organ.

Unisexual flowers : The flowers in which either androceium or gynoceium is present are called unisexual flowers. Example: papaya , maize, etc

Bisexual flowers : The flowers in which both androceium and gynoceium are present are called bisexual flowers. Example: mustard, Rose, Pitunia, Dhatura etc. The Androecium has pollen sacs in which a large number of pollen grains are formed. Male nuclie are formed by the germination of pollen grains.

The gynoecium has stigma, style and ovary. Ovary has one to many ovules in it. Female gamete or egg are formed in the ovule.

6.2 Pollination

Being light in weight, pollens reach from one place to another by the means of water, air, insects and animals. The pollens get stick to the body of insects, when they sit in the flower. When these insects sit on the another flower, these pollens fall on the stigma of the flower. Transfer of the pollen

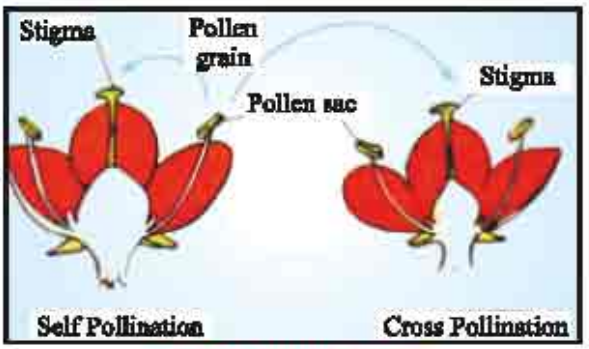

Fig 6.8 Pollination

grains from the pollen sacs to the stigma of a flower by any means of agent is called pollination.

Self pollination : Transfer of pollens from the anther to the stigma of the same flower or to the stigma of another flower of the same plant is called self pollination. Example:Pea , Tomato, Cucumber.

Cross pollination : Transfer of pollens from the anther to the stigma of flower of another plant of same species is called cross pollination.

Example:Rose, poppy.

6.3 Fertilization

By pollination, the pollens reach the stigma of gynoecium and gets germinated. A pollen tube arises from the pollen and reaches the ovule in the ovary, through the style. The male nuclei present in the pollen tube fuses with the egg cell present in the ovule. Thus the process of fusion of male nucleus and female nucleus is called fertilization. Fertilization results in the diploid zygote. This zygote further divides to form an embryo. Thus after fertilization, seed develops from the ovule and fruit develops from the ovary. When the fruit is used up, the seeds become free and germinates to form a new plant. The process to produce offsprings in this manner in the developed plants (angiosperm) is called sexual reproduction. In angiosperms, the endosperm is triploid.

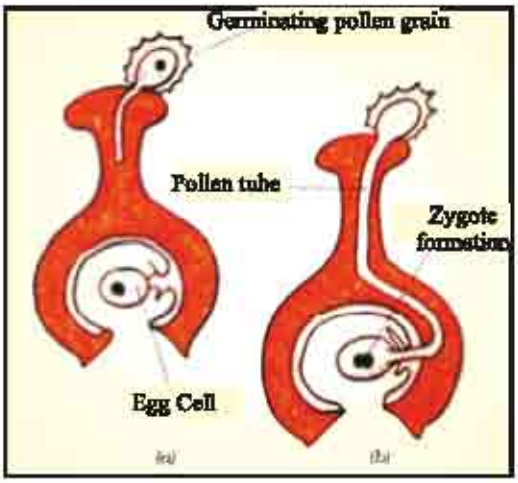

Fig 6.9 Fertilization

Development of fruit and seed

After fertilization, seed from the ovule and fruit from the ovary are developed. An embryo is present in the seed , which is responsible for formation of a new plant.

Also know this:

Largest flower	-	Rafflesia
Smallest flower	-	Wolfia
Largest seed	-	Lodoesia
Smallest seed	-	Orchid

Do all the fruits have seeds?

Which fruits do not have seeds?

Fruit: A fruit is formed in the ovary or a mature ovary is called fruit.

The wall of the ovary forms the wall of the fruit. Fruits are mainly of two types:

1) True fruit 2) False fruit

1) **True fruit** : The fruits which develop only from the ovary are called true fruits.

2) **False fruits:** Sometimes floral parts, other than the ovary, like thalamus, calyx etc. also contributes to fruit formation. Such fruits are called false fruits. For example, in apple and pear thalamus contributes to fruit formation. Thus apple and pear are false fruit.

Parthenocarpy

When the ovary directly develops into fruit without fertilization, this is called parthenocarpy. Fruits develop in such a way do not contain seeds. Example: banana, grapes etc.

All the fruits are divided into 3 classes:

1) Simple fruit 2) Aggregate fruit 3) Composite fruit

1) **Simple fruit:** When a single fruit develops from the ovary of a flower, it is called single fruit. Example- mango, wheat etc.

2) **Aggeregate fruit:** When many fruits develop from pollycarpellary and apocarpous gynoecium but remain as a group, they are called Aggregate fruit. Example- strawberry

3) **Composite fruit:** When all the flowers of an entire inflorescene participates in fruit formation, it is called Composite fruit. Example- Mullberry, Custard apple.

6.4 Heredity

You learnt that, seed gives rise to a similar plant and the animals give birth to the similar offsprings. Parental or hereditary characters are transferred from generations to generation in such offsprings.

This process of transfer of herditary characters from one ganeration another generation is called heredity.

Gregor John Mendel, for the first time, experiments of herdity on various characters of a pea plant. For his contribution in the field of genatics, Mendel is known as the father of genetics. Table 6.2 shows the list of contrasting traits of pea plant studied by Mendel.

Table 6.2 : List of contrasting pair of traits

Sr. No.	Characters	Contrasting traits
1.	Stem height	Tall/ dwarf
2.	Flower colour	Purple/ white
3.	Flower position	Axial / terminal
4.	Shape of the pod	Inflated/constricted
5.	Pod colour	Green/ yellow
6.	Shape of the seed	Round/ wrinkled
7.	Seed colour	Yellow/ green

Mendel called the carriers of these seven pairs of contrasting traits as factors. Now a days we call them genes. Why Mendel selected pea plant only for his experiments of heredity?

Let us try to find out

1) Seven clearly visible contrasting traits.
2) Short life span of pea.
3) Generally self pollination takes place in pea but if required cross pollination can be easily carried out.

Based on his observations of experiments of heredity on pea plant, Mendel formulated following three laws of inheritance:

1) Law of Dominance
2) Law of Segregation
3) Law of Independent Assortment

You will study Mendel's experiments and above mentioned laws in detail in higher classes.

What have you learnt

- All the organisms reproduces to maintain their existence.
- In plant reproduction takes place by vegetative, asexual and sexual mode.
- Vegetative parts like leaf, stem and root produce new plant in vegetative reproduction.
- Vegetative and asexual reproduction takes place in lower classes of plants.
- Sexual reproduction takes place in higher classes of plants in which male and female gametes fuse.
- In the flower of unisexual plant, male and female flowers are found separately. Male flower has only male reproductive organs and female flower has only female reproductive organs.
- Bisexual flower has both male and female reproductive organs.
- Pollination is of two types- self-pollination and cross pollination.
- Pollination can be carried out by air, water, insects and other animals.
- An Embryo is developed from a zygote.

❑❑❑

EXERCISES

Mark the correct option:

1. Vegetative reproduction is found in -
   a) Potato b) Wheat
   c) Neem d) Pea ( )
2. Fusion of male and female gametes is called-
   a) Pollination b) Fertilization
   c) Budding d) Spore ( )
3. Unisexual flower is-
   a) Maize b) Mustard
   c) Rose d) Petunia ( )

4. Bisexual flower is-

a) Papaya b) Maize

c) Cucumber d) Mustard ( )

Fill in the blanks:

1. Fern and moss reproduces by _____
2. To produce _____ of their own kind is called _____
3. _____ is formed by the fusion of male and female gametes.
4. In _____ pollens from the anthers reaches the stigma of the same flower.

Match the following:

A	B
1) Fragmentation	1) Mustard
2) Budding	2) Banana
3) Parthenogenesis	3) Yeast
4) Sexual Reproduction	4) Spirogyra

Short- answer type question:

1. Describe the various processes of asexual reproduction. Give example of each.
2. Differentiate between unisexual and bisexual flower.
3. Differentiate between self pollination and cross pollination.
4. Draw a labelled diagram of of a flower.
5. Explain parthenocarpy with an example.
6. Write the 3 laws of inheritance given by mendel.

Long answer type questions

1. Differentiate between sexual and asexual reproduction.
2. Explain process of sexual reproduction with diagram.
3. Explain the various processes of vegetative reproduction with examples.

◆◆◆

Chapter 7

Blood Circulation

Points To Study:

7.1 Blood composition and blood groups
7.2 Blood donation and blood banks
7.3 Human Heart and blood circulation
7.4 Diseases due to blood infection

In the last chapters we have studied that we get energy by digestion of food. We have also learnt that during respiration living organisms take in oxygen (O_2) and give out carbon dioxide (CO_2). Have you ever wondered how this food, water and oxygen reaches to each and every cell of our body and simultaneously how excretory substances produced in various body parts are transported to the place from where these are expelled out. In this chapter we will study about the transport of substances in the animals. In our body, a red coloured fluid is present for transporting of substances, which is called blood. Blood oozes out when there is cut or injury on our body. Blood is found in all the vertebrate example- fish, frog, lizard, goat, human etc. What is the composition of blood? What is blood? Where is blood found in the body? And what is its importance for human life? Let us find out.

7.1 Blood composition and blood groups

Take a prepared slide of blood. Observe it under the microscope with the help of your teacher. What you see in the blood?

Human body has 2 parts-

i) Plasma in liquid form ii) Corpuscles in solid form

Let us study these parts of blood in detail.

Plasma : It is light yellow, clear, sticky, and transparent liquid substance. About 50-60 percent of blood is plasma. Generally it has 90%Water and 10% inorganic and organic substances. The blood plasma is alkaline in nature due to presence of inorganic alkaline salts.

Blood contains protein, glucose, fatty acids, hormones organic substances etc. Plasma keeps the fluidity of blood. That is why blood is called loose connective tissue.

Blood corpuscles :

About 40 percent of blood is formed of corpuscles. These are of the 3 types:

1. Red blood corpuscles or erythrocytes.
2. White blood cells or leucocytes (WBC).
3. Platelets or thrombocytes.

1. Red blood corpuscles : While observing the slide, you might have seen that some blood corpuscles are round, disc shaped, flattened at both the side and demucleated.

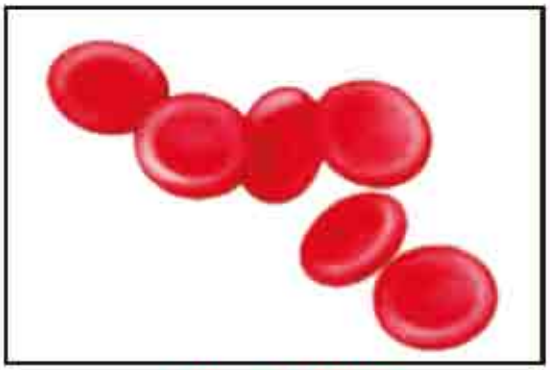

Fig. 7.1 RBC

Red blood corpuscles have a pigment called haemoglobin which provides red colour to the blood. Haemoglobin carries oxygen in the whole body in the form of oxyhaemoglobin. Red blood corpuscles are formed in bone marrow.

Functions of red blood corpuscles:

- Transportation of oxygen to every cell of the body.
- To maintain the body temperature constant.

2. White blood corpuscles: On the blood slide, there are comparatively larger and nucleated corpuscles , called white blood corpuscles. These are irregular in shape like that of Amoeba. They do not have any pigment and thus they are colourless. Their number is less as compared to red blood corpuscles. These corpuscles have many functions in the blood. These are also called the soldiers.

Fig. 7.2 WBC

Functions of white blood cells:

- Their function is defensive. They destroy the infective pathogens or parasites and keeps the body healthy.
- They clean up the blood by phagocytosis of dead and damaged cells.

3. Blood Platelets or Thrombocytes : Blood Platelets are small in size, enucleatedand irregular. Their number is also less in blood. Like RBC, these are also formed in bone marrow.

Functions of Blood Platelets:

Fig 7.3
Blood platelets

- Their main function is to help in clotting. It controls the blood flow during any injury.

We often came to hear or read through T.V. or newspaper, about the road accidents. Sometimes we even come tosee such accidents live. During these accidents, excessive blood loss occurs from the body of injured person, so he needs blood immediately. Every person has a different blood group. They are provided with the related blood from the blood bank. what are blood groups and blood bank? Let us try to find out:

Blood Groups: A scientist named Karl Landstiener(1868-1943), for the first time gave the concept of Blood Groups. It came to know that the blood group of the donor and the recepient should be the same. Donor is one who gives the blood and the recepient is one who gets the blood. If unknowingly blood of a different blood group is transfused to a patient, then blood gets clotted and blood flow gets hindered. In this case the recepient may even die. Why the recepient dies on the transfusion of wrong blood group?

Let us try to find out-

After the knowledge of blood groups, it was found that, blood has two types of protein-

(1) Antigen (2) Antibody

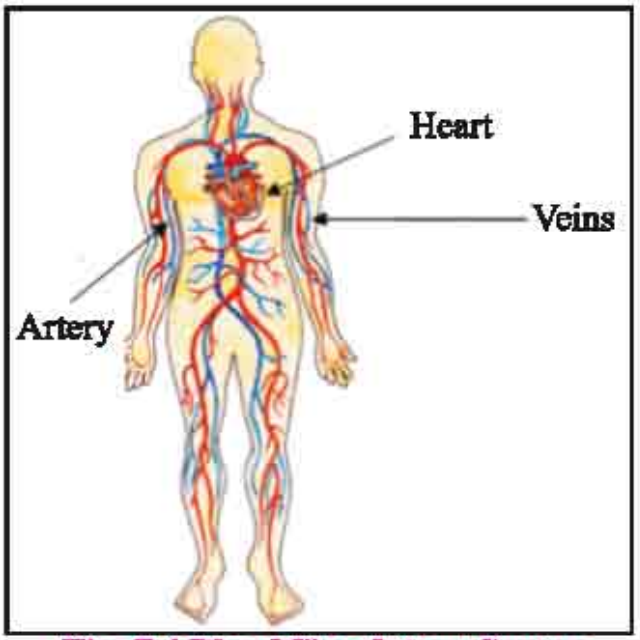

Fig. 7.4 BloodCirculatory System

(1) Antigen

Two types of antigens are found in human blood: antigen A and antigen B (these are represented as 'A' and 'B')

(2) Antibody

Like Antigens, Antibodies are also of two types- antibody 'a' and antibody 'b' (these are represented as 'a' and 'b'.)

Blood clots in the body is only possible when antigen A and antibody a or antigen B and antibody b are present simultaneously. This clotting of blood hinders the blood flow in blood vessels.

On the basis of presence of these antigens in blood, Karl Landstiener classified human blood in four groups A,B,AB and O which are shown in Table 7.1.

Table 7.1 Human blood groups

S.No.	Blood group	Antigen	Antibody
1.	A	A	b
2.	B	B	a
3.	AB	A and B	None
4.	O	None	a and b

Importance of blood groups: Knowledge of blood groups proved as a boon for the society in the form of blood donation. This made it easy for people to have blood of suitable group during accidents or diseases from blood blank or registered voluntary blood donors.

Blood groups are also of importance in the field of law and judgement. Criminals can be identified on the basis DNA test obtained from blood.

If a person has blood deficiency then it can be recovered by transfusing the matching blood groups. This technique is called Blood Transfusion. In this process the blood groups of donor and recepient are matched and then transfused as shown in table 7.2.

Table 7.2 Information about blood transfusion.

Donor blood group	Recepient's blood group			
	A	B	AB	O
A	✓	x	✓	x
B	x	✓	✓	x
AB	x	x	✓	x
O	✓	✓	✓	✓

Note: The symbol ( )means that blood can be given and the symbol (X) means that blood can not be given.

Observing table 7.2 we can say that recipient having blood group AB can take blood from people having any type of blood group while donor having blood group O can give blood to people having any type of blood group. On this basis we can say that person with AB blood group is universal recipient and person with blood group O is universal donor.

7.2 Blood donation and blood bank.

During accidents, excessive blood loss takes place which causes blood deficiency in the body of injured person. So he needs blood. Always try to take blood from the relatives as it is easy to have desired blood group. But if this is not possible then try to get it from the blood bank. The government has opened blood banks in every district hospital. Some public welfare organisations have their own private blood bank. To keep the blood in blood bank properly, preserved sodium citrate is added to it. Blood can be kept in blood bank safely for 30 days

The place where blood is stored safely is called a blood bank

Fig 7.5 Blood Donation

Fig 7.6 Blood Bank

To maintain the continuity of blood in the blood bank, blood donation is required. Blood tests are carried out for the donor's blood. If he is suffering from a serious disease, then his blood is not accepted. Blood donation camps are organised to collect the blood. Red Cross society, all government hospitals and big private hospitals have facilities to collect blood. When required, blood of desired blood group is made available to the the injured person or patients from these blood banks.

Also know this:

Who can donate blood?

Any male or female can donate blood :

1. Who is of the age 18 years to 60 years.
2. Who is of the weight above than 45 Kg.
3. Who is not suffering from the serious diseases like AIDS, Hepatitis B or C, Syphilis, Malaria or any other such disease.
4. Who has not donated blood since last three months.
5. Who has not gone through a surgery in last six months.
6. Whose haemoglobin is more than 12.5.
7. Whose blood pressure is normal.
8. Whose body temperature is 37.5 o and pulse rate is normal.
9. Female who is not pregnant.

Points to be noted after blood donation

1. Intake of liquids like juice, milk etc. within 24 hours of blood donation.
2. No physical exercise or hard work upto 24 hours of blood donation.

Functions of blood:

- Blood transport oxygen and carbon-dioxide to the body.
- Blood transport nutrients and excretory substances.
- Protects our body from diseases from destroying the foreign virus and bacteria.
- It made a blood clot while an injury thus prevents blood flow.
- It transports other substances like homones, antibodies etc.
- Maitains the body temperature.

Blood is transported by heart and blood vessels. Now we will study the blood vessels and working of heart.

Blood vessels: Body has various types of blood vessels which transports

blood from one place to another. The two types of blood vessels are-

(1) Artery (2) Vein

Artery: Arteries carry the oxygenated blood from heart to all the parts of the body. As the blood flows fast and in high pressure, therefore, the walls of arteries are thick and flexible. Arteries divide into many small vessels to reach tissues and there they get divided into much thinner tubles called capillaries.

Veins: The veins collect the blood containing carbon dioxide from all the body parts and bring it to the heart. The walls of veins are thin as compared to the arteries. Veins have valves which allow the blood only towards the heart.

The capillaries in the tissues again combine to form veins which carry blood to the heart. Let us do an activity to experience the blood flow in arteries.

Activity 1

Place index and middle fingers of your right hand on the inner part of your left wrist as in fig. 7.7. Do you feel any beating sound? Why there is such beating? This beating is called pulse and it is due to the flowing blood in the arteries. How many times beating takes place in a minute? How many pulse have you counted? The number of pulse per minute is called pulse rate. A healthy person has pulse rate of average 72 pulse per minute. Find out other body parts where you can feel the pulse. Like an example given in table 7.3, fill in the table by writing pulse rate of your friends.

Fig 7.7
Pulse rate

Table 7.3 Pulse rate

Name of the student	Pulse rate
Shashank	75

This pulse is due to the beating of heart. Let us find out the structure and function of heart.

7.3 Human heart and blood circulation

Heart is an organ that functions like a pump to transport substances by blood. It beats continuously.

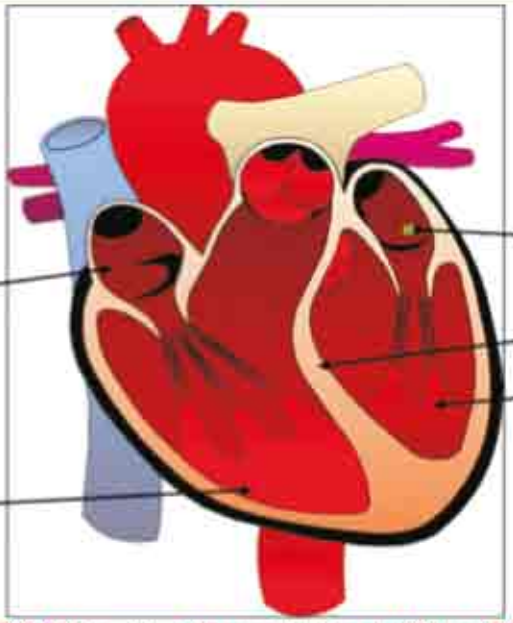

Fig7.8 Diagrametic representation of Heart

Just imagine of a pump that works for years nonstop. It appears to be impossible. But still our heart pumps the blood nonstop for life long. Let us find out more about the heart.

Heart is present in the thoracic cavity. Fold your fingers inside to form fist. Your heart is of the size of your fist.

What happens if oxygenated and deoxygenated blood mix together in heart? To avoid such condition heart is divide into four chambers. The upper two chambers are called auricles and the lower two chambers are called ventricles. The division between chambers prevents the mixing of oxygenated and deoxygenated blood. Heart contracts and expands respectively and thus the blood is pumped into the vessels. The blood from the various body parts enter into the heart via veins which contains more of carbon dioxide and is called impure blood. The impure blood from the heart goes into the lungs and becomes oxygenated. This oxygenated blood re-enters the heart and then to the cells of various organs of the body.

One contraction and one expansion of heart is called heart beat.

Doctors get an idea of health of a person by counting his pulse rate or heart beat.

Also know this-

In 1816 a doctor named R. Laennec in France invented stethoscope used to measure heart beat.

Fig 7.9 Stethoscope

Let us learn to make a model of stethoscope with the materials available near by.

Activity - 2

Aim: To measure heart beat and compare heart beats of different people.

Materials required: Watch with second's needle, paper, pen, funnel, rubber tube.

Process: Connect funnel with the long rubber tube. Place open end of the tube on the ear and funnel on the heart. We can hear a sound on listening carefully. This is the heart beat. It can also be felt by placing thumb on the wrist. Count the number of heartbeats in a minute by watching the watch and list it down.

Fig7.10 man made Stethoscope

The pulse rate or heartbeat changes according to the age. This can be better understood by following table.

Table 7.4 Pulse rate according to the age

Age	Pulse rate (approx.)	Age	Pulse rate (approx.)
1year	120 times	2 years	110 times
3 to 6 years	95 times	7 to 13 years	80 to 85 times
Young age	70 to 80 times	Old age	60 to 70 times

Have a look at this : A doctor named William Harvey (1518- 1657) discovered blood circulation. He was awarded for this and was called circulator.

7.4 Diseases caused by Blood infection :

Deficiency of blood or infection in blood causes many diseases like: Anemia, polycythenia, Blood cancer, Hepatitis B, AIDS etc.

AIDS is spreading as an epidemic in India and is still incurable. Its virus is called HIV. It is an incurable syndrome. Prevention is the cure.

Do you know?

- 1st December is World's AIDS Day.
- AIDS can be detected by ELISA test.
- Full form of AIDS is Acquired Immuno Deficiency Syndrome.
- AIDS is spread by HIV virus.

What have you learnt

- The blood flowing in the body of organisms is red due to the presence of haemoglobin pigment.
- Blood has plasma, Red blood cells (RBC), White Blood cells (WBC) and Platelets. (thrombocytes)
- Heart of an adult person beats on an average of 72 times per minute, called heart beat.
- Arteries take pure blood from the heart to all parts of the body.
- Veins bring back impure blood from all the body parts to the heart.
- Blood transports Food, hormones and gases.
- Scientist named Karl Landsteiner discovered blood groups.
- Contraction and expansion of heart is called heart beat. It is measured by Stethoscope.
- Blood infection causes diseases like AIDS, anemia, poly cythenia,hepatitis etc.
- Blood has four groups A,B,AB,O.
- AIDS is spread by HIV virus.

EXERCISES

Mark the correct option:

1. Amount of water in the blood plasma is about:
   a) 70% b) 90%
   c) 10% d) 45% ( )
2. Red blood corpuscles are also known as :
   a) RBC b) WBC
   c) Platelets d) Pulse ( )
3. Which of the following causes red colour of the blood?
   a) Fibrin b) Antigen
   c) Haemoglobin d) Platelet ( )

4. How many times does the heart of an adult man beats?
   a) 50 times b) 72 times
   c) 110 times d) 120 times ( )

Fill in the blanks:

1) _____ kills the bacteria that enters into the body.
2) There are _____ groups of blood.
3) Impure blood is brought back to the heart by _____
4) Blood containing carbon dioxide is purified in the _____

Answer in one word:

1) Name the corpuscles that clots the blood.
2) What keeps the blood in liquid form?
3) How many chambers are there in the heart?
4) How many types of antigens are there?

Short answer type questions:

1) Name the various blood vessels.
2) How many types of blood corpuscles are there?. Name them.
3) Why are White blood cells called the soldiers of body?
4) Write the functions of blood.
5) What will happen if clot is not formed on injury?

Long answer type question:

1) Describe the structure of heart with diagram.
2) Write a short note on
   a) Blood group b) Blood Bank

Activity work:

1) Visit blood bank near your area and check your blood group.
2) Make a chart of blood groups.
3) Make a chart of heart with the help of thermocole or hardboard.
4) Make a modal of stethoscope.
5) How many times your heart does beats in a minute, calculate.
6) There is no harm in blood donation. Find out the importance of blood donation from a doctor, make a list and paste in your classroom.

◆◆◆

Chapter 8

Our Health, Diseases and Prevention

Points To Study :

8.1 General diseases
8.2 Factors of diseases: worms
8.3 Some specific diseases.

From the ancient times man wishes to be long living and healthy. "A healthy mind resides in a healthy body". Our body regularly carry out functions like digestion, excretion, respiration etc. A person gets diseased, if there is irregularity in these functions.

Activity1

Visit the government hospital of your locality. Observe the admitted patients carefully without disturbing them. Do not touch anything over there. Collect the knowledge of the diseases of different patients with the help of doctor and nurse. Note down all the information in your diary.

You might have seen different cells made for the patients of different diseases where you cannot enter.

- Can you answer why this is so?
- Why do you have to cover your mouth with a handkerchief while sneezing and coughing?
- You might have read in the newspaper that cholera has been spread in the flood affected areas in Gujarat ? Why was this happened?

Diseases are of two types:

- **Infectious disease:** those diseases which spread due to contact with one another. Example: Cholera, typhoid, tuberculosis, cold etc. these spread due to contact with air, water and food and insects.
- **Non-infectious diseases:** those diseases which not spread from one person to another. Example: Cancer, joint pain etc.

Teachers should discuss the reports of all the students in the following table on the black board.

Table 8.1 General diseases of human being, their factors, symptoms, prevention and treatment

Sr. No.	Disease	Disease causing Microbes	Symptoms	Preventive measures	Treatment
1.	Tuberculosis (T.B.)	Bacteria- *Mycobacterium* Transmission by wind	Loss of appetite, loss of weight, weakness, continuous cold and cough, fever at low temperature, Blood in the spit, chest pain, breathing problem after long walk, swelling in the lymph nodes, effect on alimentary canal, bones, lungs.	Isolation of TB patient, keeping his things separate, , vaccination at proper time, preventing spitting at anywhere, covering mouth during coughing,	Sputum test, chest X-Ray, use of M.D.T. as the doctor suggests, be under the control of DOTS
2.	Cholera	Bacteria- *Vibrio cholerie* Transmission- By contaminated water and food	Vomiting, loose motion (diarrhoea) dehydration, fever, thirst, drying of tongue, muscular cramp, sukening of eyes infection in stomach and intestine.	Personal hygiene and good habitseating properly cooked food, drinking boiled water, vaccination, proper methods of discharge faeces and rotten things, maintain distance with the patient	Use of ORS solution and proper medicines
3.	Typhoid	Bacteria- *Salmonella typhii* Transmission – By water	Infection in small intestine, daily occurrence fever and headache, higher fever in the second weak, less fever in third and fourth weak, body pain,constipation, low heart beat, red spots on the upper surface of tongue,	Keeping food and water clean, discharge of faeces and other contaminated things at proper place, protecting the food from the flies, (vaccine A and B should be applied)	Full rest to the patient on fever, treatment with antibiotics, taking medicines under the doctor's supervision

4.	Polio	Virus- Polio virus Transmission – By air/ water	Effect on spinal cord, brain, legs, fever, contraction of muscles development of affected limbs are slow, headache, vomiting, pain in the neck, affected limb doesn't work due to damage of nervous system,. Children of 6months to 3 years may be affected by polio	By giving polio drops.	Operation as directed by the doctors, use of Jaipur foot, physiotherapy.
5.	Rabies (Hydrophobia)	Virus Transmission - Infected Dog, monkey, fox, jackal, whose saliva contains rabies virus	High fever, headache, restlessness, blockage of throat, hydrophobia	Control of stray dogs and cats, vaccination of pet and stray animals	Keep distance from infected animals. Washing the injured area with soap and water, use of anti-rabies injections under the guidance of doctor
6.	Chicken pox	Virus- *Varicella zoster* Transmission - By air/ direct contact	Light/ medium fever, backache, apprehension skin lesions on the whole body, first on neck, then on face and on the legs in the last, healing of lesions after 4-7 days.	Separating the patient from others, keeping his things isolated	Applying special ointment/ coconut oil on the lesions, using appropriate medicines
7.	Measles	Virus Transmission - By air	Red rashes on the body, itching , burning sensations.	Isolating the patient, keeping the things of the patient separately, vaccination	Applying antiseptic cream, using medicines under the guidance of the doctor.

8.	Cold	Virus-Rhinovirus Transmission – By Air	Infection in the mucous membrane of respiratory tubule, nose and throat, watery discharge from the eyes and nose.	Cover mouth while sneezing or coughing, use of clean handkerchief	Doctor's advice, increase in intake of vitamin C, taking steam
9.	Diarrhoea and dysentery	Bacteria-*E. coli* Transmission-By Toxic food / water	Secretion of a sticky substance with the faeces, vomiting, recurrent infection in intestine, frequent diarrhoea , dehydration, stomach ache, headache, weakness, intense thirst.	Keep the toilets clean, keep the eatables covered, maintain hygiene, use boiled and filtered drinking water, wash the fruits with hot water before use, don't let patient's faeces or vomit open.	ORS solution, electoral, medicines at doctor's advice.
10.	Malaria	Protozoa-Plasmodium Transmission-Female *Anopheles* mosquito	Fever with shivering, fever at regular intervals, body ache, intense thirst, redness on face, swelling in liver and spleen, weakness etc.	Don't allow water to stand near houses, killing of mosquitoes, fogging, use of mosquito net	Blood test and taking medicines on doctor's advice.

Fig 8.1 Patient suffering from Malaria and its treatment

8.2 Pathogenic worms

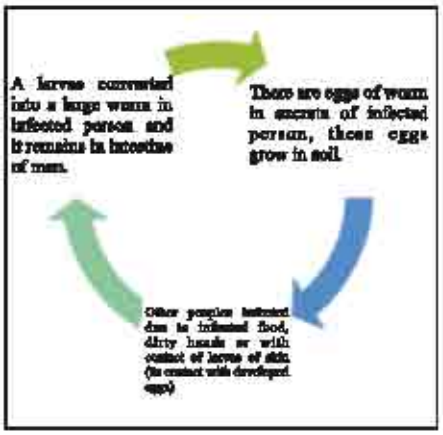

Fig 8.2 : Worm infection cycle

Harmful effects of worm on health of children:

- Tiredness and restlessness
- Loss of appetite
- Stomach ache, vomitting and diarrhoea
- Blood with stool
- Anemia
- Malnutrition
- Swelling in the stomach
- Continuous cough
- Loss of weight

Methods of prevention from worm infection:

- Wash hands with soap before meals and after toilet.
- Wash fruits and vegetables properly before use.
- Drink clean or boiled water.
- Wear shoes.
- Keep nails trimmed and clean.
- Open sanitation should be avoided. Use toilets.

Fig. 8.3 Method to prevent worm infection

- Keep the area near toilets clean.
- Make the children understand about benefits of worm control.

Benefits of worm control

- Children can go to school or AaganBadi daily.
- They remain active and their immunity increases.
- Their growth is rapid.

8.3 Some specific diseases:

Have a look at these also:

(1) Naru/ Bala - (Guinea worm)

It is caused by white thread like round worms which are 30 cm to 125 cm in length.

Transmission : By water

Microbe : By micro-organisms Cyclops which enter into the body through water.

Causes of disease:
1. Drinking uncleaned water.
2. Drinking impure water from wells, ponds or bavdi.
3. Drinking unfiltered water.

Symptoms :
1. Boils on skin of legs and hands.
2. Female worms grows in the muscles.
3. Severe pain at the site of boils.
4. Fever
5. If the worm is not taken out timely then it dies and releases a poisonous substance which causes nodes.

Prevention:
1. Drink filtered water.
2. Drink boiled water.

(2) Leprosy: By bacteria

Cause : Due to continuous contact with the patient.

Symptoms :
1. Rashes on the skin.
2. These rashes are senseless.
3. There is no feeling of injury, pain or burn on it.
4. If in excess, these organs do not work.
5. Deformity in the digits.

Prevention
1. Keep the patient isolated.
2. Keep their belongings also isolated.
3. Wash their clothes with Dettol etc.

Treatment
1. Surgery.
2. Vaccination
3. Use of artificial organ if the whole organ gets damaged.

(3) Acquired Immuno Deficiency Syndrome-AIDS

It is a deadly disease in which the immunity system of the patient is damaged due to which the capability of fighting against diseases is lost in the person.

Causes of diseas
1. It is spread due to HIV virus.
2. Infection from a infected person.
3. By sexual intercose.
4. By Needle at the time of blood transfusing or taking injection.
5. From infected blade and other sharp objects used by the barber.
6. From infected mother to the growing baby in the womb.

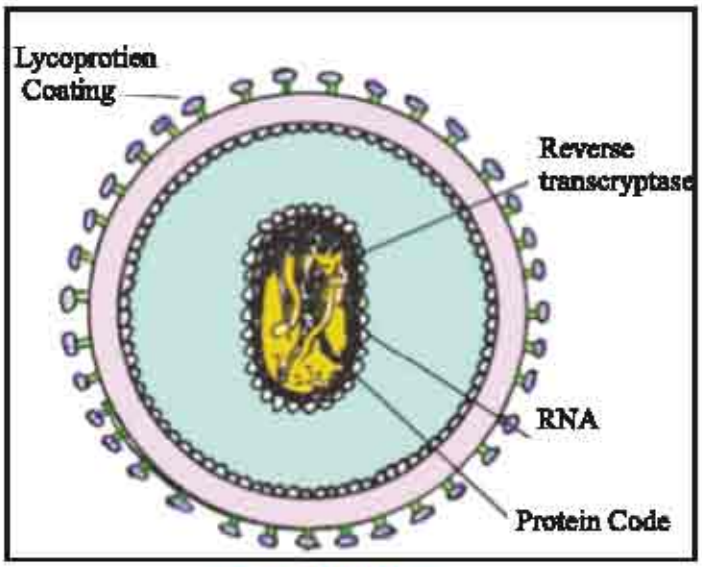

Fig 8.4 HIV virus

Symptoms	1. Swelling in the lymph glands. 2. Decrease in the platelets count which results in fever and bleeding. 3. Sweating at night. 4. Weight loss. 5. Loss of memory, difficulty in speaking and thinking ability. 6. The risk of infection of other diseases increases due to weak immunity.
Prevention:	1. While shaving make it confirm that every time a new blade is used. 2. HIV test before blood transfusion. 3. Destroy the syringe after a single use. 4. Living a controlled life style.
Treatment:	Prevention is better cure of AIDS.

(4) Cancer It is a deadly disease.

Cause of disease:	1. Uncontrolled cell division. 2. Rapid cell division.
Symptoms:	1. A tumour is formed at the site of uncontrolled cell division. 2. The tumour is painless during initial stages. 3. At later stages there is intolerable pain in the tumour. 4. It could be in the tongue, throat, bone, blood, lungs, uterus etc.
Prevention	If it is identified at earlier stages, then the life of patient could be saved by cobalt Radio Tharapy and Chemotherapy or removing the cancerous organ if necessary.
Treatment:	By surgery or chemotherapy of cobalt.

(5) Heapatitis A

Cause of disease:	Virus
Transmission By:	Water
Symptoms:	1. Weakening of liver.

2. Water in the liver.
3. Indigestion.

Prevention:
1. Use boiled water.
2. Vaccination.

Treatment: Treatment according to advise of doctor.

(6) Haemophilia It is a genetic disease. Its genes are present on the sex chromosome X of males and are transmitted from one generation to another by females.

Symptoms
1. Blood flows continuously even on a small injury.
2. Blood doesn't clot.
3. Results in death due to excessive blood loss.

Treatment: Blood transfusion on time.

(7) Food poisoning Due to the microbial contaminated food.

Symptoms: Vomiting, nausea.

Causes: Microbes produces a poisonous substance in contaminated food, which makes the food poisonous

Prevention: Avoid contaminated food.

Treatment: Timely doctor's advice.

(8) Swine flu

Causes of disease:
1. Coming in contact with the infected person.
2. Untidy and infected hands.

Symptoms:
1. Difficulty in throat (cough, sore throat)
2. Cold
3. Fever

Prevention:
1. Wash your hands with soap again and again.
2. Use handkerchief and tissue paper during sneezing and cough.
3. Avoid going at the conjusted areas.
4. Use mask.

Treatment: Temi flu tablets.

(9) Anemia

Causes of diseases: Due to deficiency of haemoglobin and blood.

Symptoms:
1. Whiteness of face.
2. Weakness.
3. Tiredness.
4. Vartigo/Giddiness.
5. White boils on the tongue.

Prevention: Intake of nutritious food, sprouted grains, green vegetables, Anjeer, beet root, brinjal, sesame til etc. according to the body Requirement.

Treatment: Iron tablets.

Important:

Adolescent students are distributed iron tablets free of cost to prevent anemia. We should take these tablets asadviced to avoid anemia.

(10) Dengue

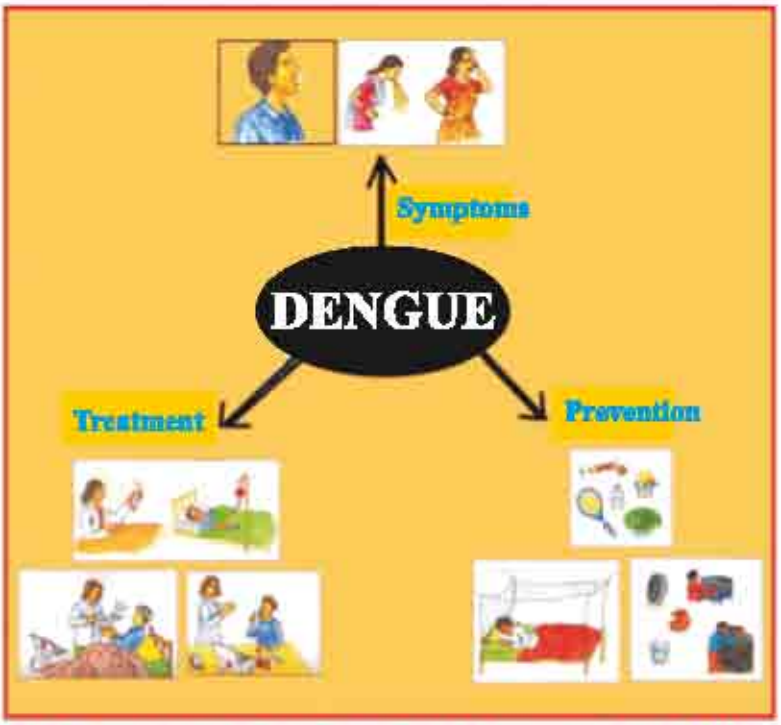

Fig 8.5 Symptoms, treatment and prevention of Dengue

What is Dengue fever?

It is a viral disease caused by one of the four types of dengue viruses.

Transmission:

It is transmitted through female Aedes aegypti mosquito from an infected person.

Causes:

1. Due to growth of mosquitoes in the dirty water.
2. Due to growth of insects.
3. Due to mosquito bite.
4. Due to decrease in blood count platelets.
5. Due to growth of mosquitoes in the cooler water.
6. Due to unhygienic conditions.
7. Due to deficiency of blood.

Symptoms :

After 3 to 14 days of infected mosquito bite, the symptoms Of Dengue fever appear. They are as follows:

1. Fever after shivering.
2. Headache.
3. Pain in the eyes.
4. Body ache or joint pain.
5. Loss of appetite.
6. Nausea, vomiting.
7. Diarrhoea.
8. Red rashes on the skin.
9. Bleeding from eyes and nose in severe conditions.

Prevention methods :

1. Do not allow water to stand in and surrounding your house.
2. If a container always has water, then wash it properly with soap and water so as to remove the mosquito eggs.
3. Spray insecticides in the house.
4. If not in use then drain out the cooler water and dry it completely.

5. Use net on the doors and windows.
6. Cover the body completely.
7. Use of mosquito net at night.
8. Use spray, cream etc.
9. Encourage others also to prevent mosquito spreading.
10. Keep your surroundings clean.
11. If anyone near you is found to be suffering from dengue, then provide this information to the medical department and Nagar Nigam so that they could immediately manage the mosquito control programmes.

Treatment:

1. Patient should take rest at the advice of doctor and should take medicine properly.
2. Patient should take sufficient food and water.
3. Regular check of platelets should be done.
4. Juice of leaves of papaya should be taken as it increases the platelets count.

Vaccination

Your mother must have vaccinated you in your childhood to keep you healthy. You might have seen Amitabh Bachchan propaganding for pulse polio drops. Polio drops are a type of vaccine given to the children to prevent them from polio.

When we are ill, the pathogenic microbes enter into our body and antibodies produced in our body are not able to fight against them. This makes us ill. If these antibodies kill them then we do not become ill. Our body also remembers how to fight with a particular virus or bacteria.

Vaccine: If dead or inactive microbes are made to enter into our body, then the body cells produce antibodies to fight against them and destroys the microbes. These antibodies , from then always remain in the body and protects us from diseases. Vaccines function like this only. Many diseases like- cholera, T.B., small pox, hepatitis etc. can be prevented by vaccination.

Do you know-

Edward Jenner, in 1796, invented vaccine for small pox.

Come let us have a look:

National programmes for disease prevention:

- **National Malaria Eradication Program:** This program was started in 1953 at the national level. The main points of this program is fogging (spray of chemicals), identification of patients and distribution of medicines.
- **National Tuberculosis Eradication Program:** The main aim of this program is to establish T.B. centres at the national level, district centres and show centres . These centres are meant for vaccination of healthy person, identify the patients and provide proper treatment, advice and medical aid to them.
- **National Leprosy Eradication Program:** The main aim of this program is to identify initial stages of the disease in the patients and provide treatment to them. To manage rehabilitation, and livlihood for the patients.
- **National Pulse Polio Program:** The main aim of program is to make the country polio free. In this program children are regularly given polio drops.

Healthy children symbolise a prosperous nation

Smt. Savitri Bai Phule

Smt Savitri Bai Phule was born in the Nai village of Satara district of Maharashtra. She was married at the early stage of 9 years. At that time untouchability was prevailing in India. But still Savitri Phule managed to provide water to all from her well.

She strongly opposed the untouchability, casteism, etc. When plague was spread as an epidemic, Savitri Phule came forward to help and she organised various medical camps for four peoples.

She was one of the important female leaders of the modern India. She struggled for the rights of the women.

What have you learnt

- The diseases which are spread due to the contact with one another are called infectious diseases.
- The diseases which are not spread due to the contact with one another are called non-infectious diseases.
- Tuberculosis is caused by Myco-bacterium tuberculosis.
- Cholera is caused by Vibrio cholerae.
- Typhoid is caused by Salmonella typhii.
- Polio is caused by polio virus.
- Chicken pox is spread by Varicella zoster.
- Cold is spread by Rhinovirus.
- Malaria is spread by Plasmodium.
- The tablet of Albendazole is the treatment of worms.
- Naru disease is caused by white thread like round worms.
- AIDS is caused by Human Immuno Deficiency Virus.
- Haemophilia is a genetic disease. Its genes are present on the sex chromosome of males and are transmitted by females from one generation to another.
- Swine flu is an infectious disease, so the swine flu patient is kept isolted.
- Cancer is due to the uncontrolled cell division.
- An immediate medical help should be taken in case of food poisoning.
- There is deficiency of blood in anemia.
- Many diseases like: cholera, T.B., small pox, hepatitis etc. can be prevented by vaccination.

□□□

EXERCISES

Mark the correct option:

1. Leprosy is caused due to
   (a) Virus (b) Bacteria
   (b) Protozoa (d) Amoeba ( )
2. An example of infectious disease is
   (a) Cholera (b) Anemia
   (b) Joint pain (d) Cancer ( )
3. Virus that transmits chicken pox is
   (a) Varicella zoster (b) Rhinovirus
   (b) Plasmodium (d) E. Coli ( )
4. In body anemia results in the deficiency of
   (a) Blood (b) Vitamin
   (b) Water (d) Mineral salts ( )

Fill in the blanks

1. Polio is transmitted by---------- and--------
2. ----------Solution is used in diarrhoea and dysentry.
3. Cold is caused by----------
4. ----------Tablet is helpful in treatment of round worm infection.

Match the following

	Column I	Column II
1.	Anemia	Albendazole
2.	Swine flu	Blood deficiency
3.	Worm infection	ORS solution
4.	Diarrhoea	Temiflu

Short answer type questions

1. Draw the diagram of HIV.
2. What is the function of vaccine?
3. Write the symptoms of swine flu.
4. Write the methods of prevention of AIDS.
5. Write the symptoms of cancer.

Long answer type questions

1. Explain the cycle of worm infection. Write in detail the harmful effects of worm infection in children, methods of prevention and benefits of worm control in children.
2. Explain in detail the following
   (1) Haemophilia (2) Food poisoning
   (2) Naru disease (4) Anemia
   (5) Leprosy

Activity work

1. List the infectious and specific diseases of your area. Prepare a chart of the causes of infectious and specific diseases, their symptoms and preventive measures. Paste the chart in your classroom.
2. List the efforts done in your area to make it free of diseases and also contribute in them
3. Observe the hospital of your area and list the instruments used over there along with their use.
4. With the help your teacher, make your area aware of vaccination programmes and also help in vaccination.
5. Visit your locality or village in groups and inform them about the methods of prevention of diseases that you studied.
6. Prepare a chart of elemental source and effect of food and also the diseases caused by their deficiency and excess. paste the chart in your class room.
7. Collect the information regarding the diseases published in the newspaper and magazines. Make a collage of it and paste in your school.
8. Participate actively in the awareness programme organised on World AIDS Day(1st December).
9. Conduct your duty in the AIDS awareness and prepare a note.

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Chapter
9

Work and Energy

Points to Study

9.1 work
9.2 Energy
9.3 Mechanical energy
9.4 conversion of energy
9.5 Sources of energy
9.6 Measures of energy conservation.

In normal conversation all laborious activities like- reading, writing, cooking, carrying weight, swimming, etc. called work by us. Shatish feels tired after 4 hour reading, whereas Reeta does not feel tired after 8 hour reading. Who has done more work? This cannot be answered logically. Thus physical or mental labour cannot be defined as work in science. Then what is called work in scientific terms. Let us know about it.

9.1 Work

Activity-1

1. Put a ball on floor and push it. i.e exert force on ball.
2. Push the walls with your hands.

In both above activities, which is the object displaced from its one position to another position? Here, the ball has travelled some distance in certain direction. The distance covered by an object in certain direction is called displacement. So we can say that ball is displaced due to force exerted on it whereas the wall is not displaced at all. Becuase of this, displacement of walls is zero.

The action for producing the displacement by exerting force on object is called work.

In first object (ball) is displaced. In this action , work is done. Whereas in second object (wall) is not displaced. So, in this action, work is not done. That means, wok done after exerting force on wall is zero.

Most of time we are curious to know how much work was done by us? How do we calculate amount (quantity) of work? Let us know about it.

Activity-2

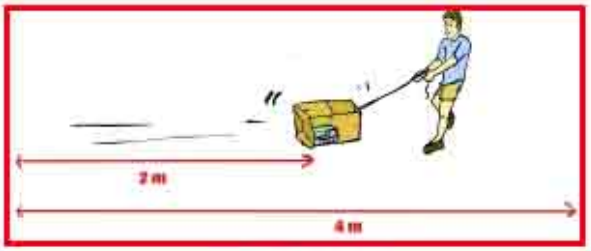


Fig. 9.1 (a)

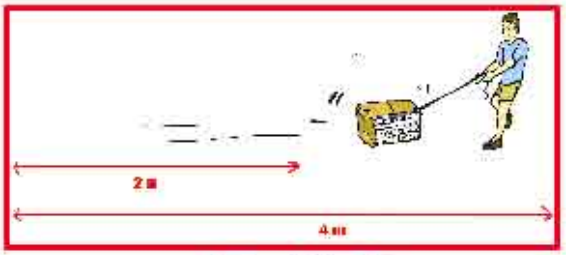


Fig. 9.1 (b)

1. Put only two books in empty card board cartoon and close it. Now, clamp a rope on it and drag upto two meter on floor. Now, drag it upto four metre. In which situation work is done more?(as fig 9.1(a)). It is clear that the more displacement more work done by an object.

"Work done on object depends on displacement."

2. In earlier cartoon, put only two books and drag it upto 4 metre. After that, fill it completely with more books and drag it upto 4 metre. { As in fig 9.1(b),} in both situations displacement is equal. In which situation more force is exerted? In which situation work is done more ?

In second situation more force is exerted. In second situation work is done more. It is clear that the more displacement more work done by an object.

"Work done on object depends also on force exerted on object."

On the basis of above discussion, we came to know that work depends upon the following two dialogue-

1. displacement covered by an object.
2. Magnitude of force exerted on object

If force is exerting on object then displacement covered in the direction of force, then work done can be calculated by the following formula-

Work = force × displacement in direction of force

The International unit (SI) of work is 'Joule'.

9.2 Energy

Activity - 3

You can do many work due to your capacity of doing work. Similarly animal also can do many work as per their capacity. Discuss and make list of work done by the animals with help of fig 9.2.

Fig 9.2 Work done by the animals

In nature we see that not only living body has capacity to do work but also non living body also do work e.g. we can run big machines by water falling from height on it, wind mill drives by fast blowing air, the generator is running by water steam using coal's heat, etc . So we can say that objects, either living body or non-living body, can have capacity to do work.

Capacity of doing work in objects is called energy.

It is clear that flowing water, air, coal, steam, diesel, petrol, power, etc., has energy. It can be used to do many works.

Activity-4

The objects, which have energy, are used to do work on other objects. Some action are given in table 9.1. write the name of object on which work is done and by which work is done.

Table 9.1

Sr. No.	Action	Object by which work is done	Object on which work is done
1	Playing football	Player	
2	Driving bull cart		
3	Moving the leaves		
4	Driving wind mill		

It is clear that an object does work on other object. To do work, first object losses energy due to that energy of first object decreases. The work done by the first object is appear in second object. As a result the energy of second object increases.

We can say that work and energy are equivelent to each other. That is why, the international unit of energy is Joule.

There are various form of energy. One of them is called mechanical energy. What is the mechanical energy? Let us know about it.

9.3 Mechanical energy

Mechanical energy is combination of kinetic energy and potential energy.

Kinetic energy :

We have seen that flowing water takes many things with it. Objects are moving with flowing air. Wind mill can run by wind energy. Ball in motion collides with another ball then another ball also came into motion. Search similar examples. Where object possrecss capacity to do work (energy) due to their motion.

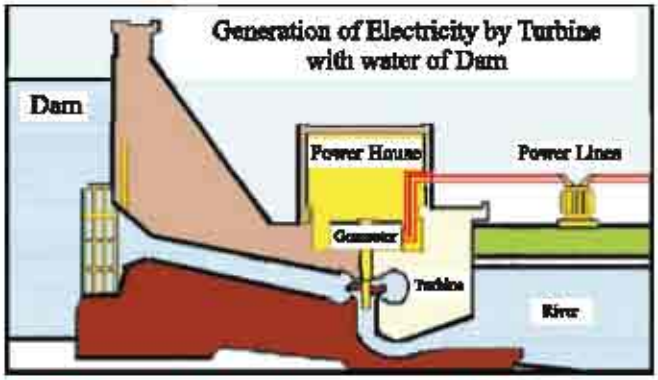
The capacity of doing work due to an object is in motion , called kinetic energy.

Potential energy:

The turbine can be rotated by water falling from height. Motion of stone by the sling-shot rubber. Similarly, in arrow-bow system , the arrow is fired by stiff string of bow and it comes into motion. So we can say that energy is stored intheri objects due to change in position or shape bow and arrow.

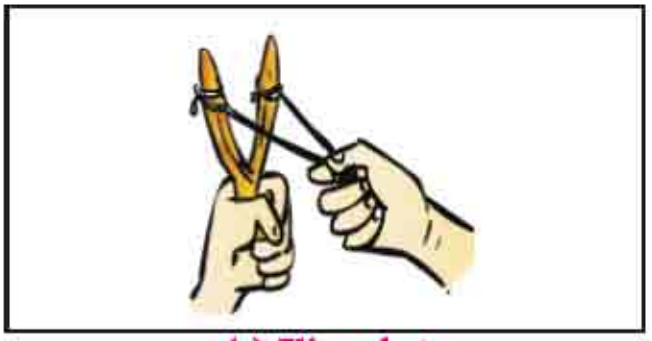
Look the machine inside the key-toys car. Similarly, look the machine inside key-watch system. Spring is inside of it. When we rotate the key then spring is pressed. i.e. change occurs in position. That is why the energy stored in it to perform work. Resultant, they starts to motion.

When we make change in position or shape of an object, then mechanical energy stored in it, call it potential energy.

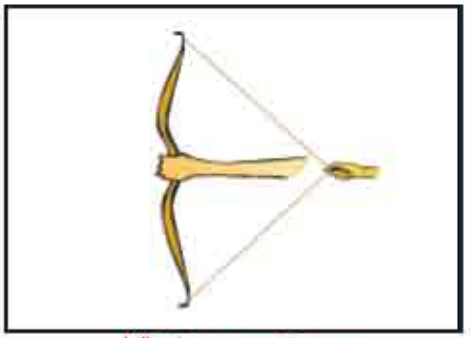


(a) To run turbine by water falls from dam.

(b) Internal view if spring loaded watch.



(c) Sling-shot.



(d) Arrow-Bow.

Fig. 9.3

So we can say that mechanical energy has two forms-

1. Kinetic energy and 2. Potential energy.

Various forms of energy

You have already read the following topic as motion, heat , light, electric, sound, magnet, atomic structure and chemical reactions etc. Discuss with help of table 9.2 about the various forms of energy related to it.

Table 9.2 Various forms of energy

SR No.	Energy	Brief description	examples
1	Mechanical energy · Kinetic energy · Potential energy	Energy stored in objects due to in motion or in position	Due to motion: Water, air, Vehicle, ball, etc. Due to position: Spring, sling-shot, arrow-bow, etc
2	Heat energy	Energy stored in burning objects of hot objects	Run the engine due to heat of coal, motion in vehicles due to petrol or diesel, etc

3	Chemical energy	Energy stored in fuel. Chemical energy converts into electric energy in cell or battery.	All types of fuel.
4	Light energy	Energy stored into light of sun or bulb, etc.	Heating the objects in sun rays, electric generation by solar cell.
5	Electric energy	Energy obtained due to charge in motion.	Lightning of bulb, electric fan, electric motor, etc.
6	Magnetic energy	Energy stored in magnetic field	Iron objects attract in magnetic field.
7	Sound energy	Energy stored in sound (vibration)	Sound obtained by various musical instruments vibrations.
8	Atomic energy	Energy obtained nuclear fusion or fission.	Electricity generation in atomic (nuclear) reactor.

9.4 Conversion of energy

Energy can be converted one form to other form. Look carefully at the fig. 9.4 and tell which form of energy is converted into other form of energy?

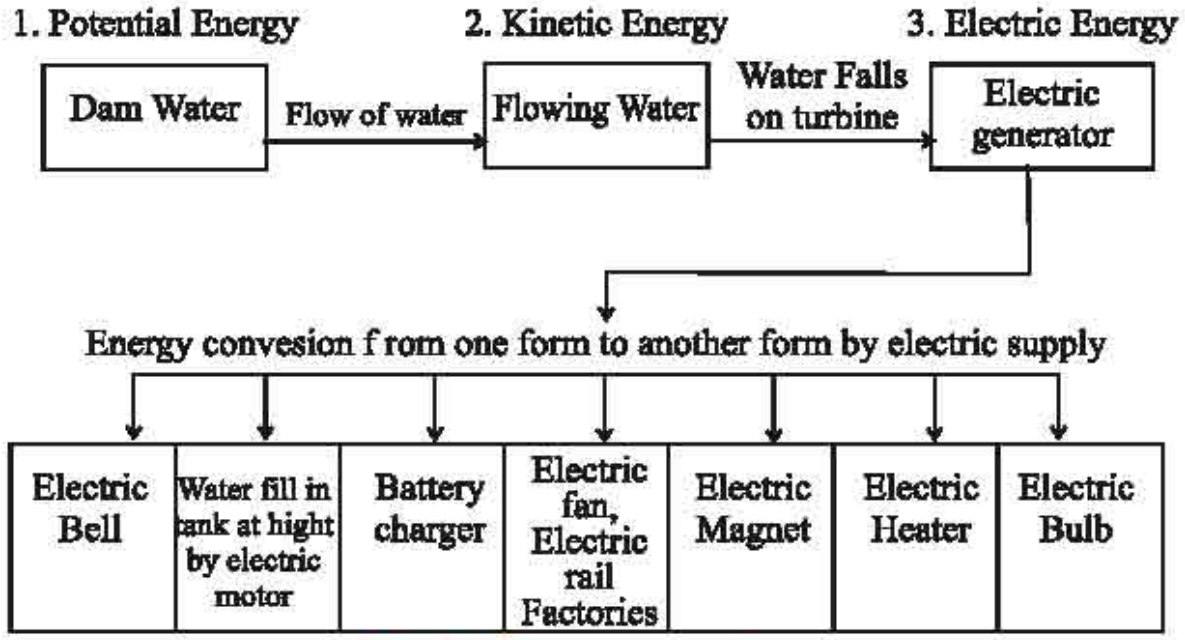


Fig. 9.4 Energy conversion.

Activity 5

In daily life we see the energy conversion from one form into another form. On the basis of your daily analysis, fill the table 9.3

Table 9.3

Sr. No.	Item name	Energy consumed by the item.	Energy conversion by item.
1	Bulb or tube light	Electric energy	Light energy
2	Electric heater	-	-
3	Solar cell	Light energy	
4	Electric cell	-	-
5	Microphone	-	-
6	Loudspeaker	-	-
7	Turbine run from Dam	-	-
8	Diesel engine	-	-
9	Nuclear reactor	-	-
10	Wind mill	-	-
11	Dynamo / electric generator	-	-

9.5 Various sources of energy:

We use many energy resources to get energy for daily routine work e.g. cooking food from coal, wood, kerosene, fuel gas, bio-gas etc. Petrol or diesel is needed to run vehicles. Various energy resources- kinetic energy of water, heat energy of coal, wind energy, etc. are used to generate electricity. These energy resources are classified as following:

Conventional energy resources:

LPG, diesel, petrol, kerosene, natural gas, mineral coal, etc, are taken out from underground of earth. It is assumed that before lacs of year , many living bodies and plants are buried in to earth due to earths movements. As time elapsed, it is converted into petroleum or mineral coal due to high pressure and temperature under the earth. It is called fossil fuel. We use these materials after conversion of the stored chemical energy into heat energy. We use wood to cooking food. It is the reason to cut the forest and reduction occurs in wood.

The fossil fuel and wood fuel petroleum, diesel, natural gas, coal, etc. are called conventional energy resources.

The use of conventional energy sources are continuously increasing to full fill the energy demand due to increase in population and development in various sectors. These fuel reservoir is slowly depleting by continuously ejecting from underground of earth. If it is used at the same rate then these will sources deplete very soon and energy crisis will appear in the world. Lets assume if supplies of petrol or LPG gas are stop then what would be it seffect ?

To avoid from globed energy crisis in future, it is necessary to do judicial use of the conventional energy resources, to search for alternative resources of energy and increase it uses. What are the alternate energy resources ?

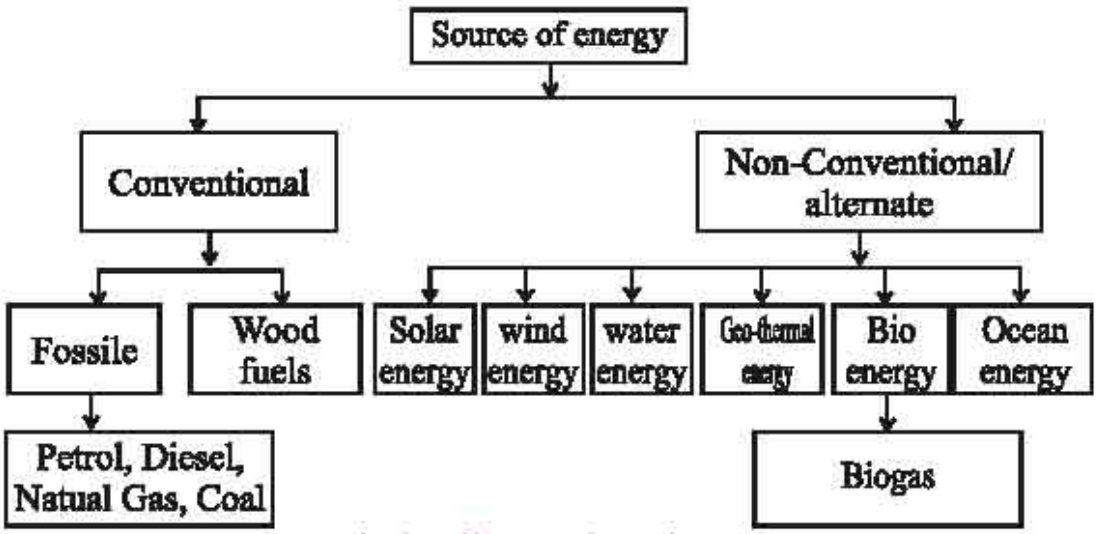


Fig 9.5 Conversion of energy

Conventional and non-conventional energy sources:-

Energy obtained from - alternate sun, wind, water, bio-waste, atomic reactor, oceans, underground earth energy, etc are called non-conventional energy resources or alternate energy resources. These sources can be used repeatedly. these is also called renewable energy resource. These resource never depletes. To extract more energy from theses sources, research is continuously going on by the scientist. Lot of apparatus are available in market to convert solar energy into electric energy, heat the water, cooking of food items, etc. wind mills are installed in many places to generate electric energy from wind energy. Our government is providing funding to install bio-gas plant and use of dung or other bio-waste. It is called bio energy. The big size dams are build on the big rivers to run turbine by water falling on it through height. Turbine is attached with electric generator which produce electric energy. This arrangement is called hydro plat. The electricity generated by all these means is supplied to big cities, small villages, etc. to use it.

The electricity is generated from atomic (nuclear) reactor. This type of reactor is called atomic reactors. In rajasthan, a atomic power plant is situated at Rawatbhata in chittorgarh district which generates electricity. Submarine also runs by use of atomic energy.

The energy of tides, prompt waves and currents in ocean can be converted into electrical energy. It is called ocean energy.

Temperature increases as proceed underground to earth. This heat energy can be converted into electrical energy. It is called geo-thermal energy.

Fig. 9.6 Wind mill of solar energy plant.

Activity -6

find out the location of various power plants- hydro , thermal and atomic power plants, in Rajasthan. And mark all these on Rajasthan map.

Save energy is the conserve energy.

To protect ourselves form world wide energy crisis, we must conserve energy. It is duty for all of us to use energy judiciously . What do you do for save energy? Let discuss the energy measures and enlist them.

9.6 Measures of energy conservation.

1. Use electric objects as on need. Switch off all the electrical instruments when there is no one present.
2. Save the fuel by using solar cookers, advanced hearth, pressure cookers, etc. do not burn the fuel un-necessary in kitchen gas (LPG), kerosene, stove etc.
3. stop the engines when you are stay at any location or waiting for an person. By this mechanism you can save petrol, diesel. vehicles check up and service must do routinely. Use optimized oil and air.
4. By increasing the use of solar energy, we can save more conventional resources.

5. We can conserve the conventional energy resources by producing biogas from the bio-waste matter and dung.
6. We must use such technology during the building construction so that building will cool in summer and hot in winter. We can reduce use of A.C. or heater by this mechanism and save electricity.
7. To make use of electric energy or other energy form to manufacture daily routine life objects. Use these objects with judiciously.
8. The electricity may be conserve by using LED lights in place of tube lights or normal bulb in houses or institutions.

What you have learnt

- Work done by an object depends on the force exerted on object and displacement in the direction of force.
- The capacity of doing work is called energy. The international unit (SI) of work and energy is Joule.
- The energy in moving objects due to it is in motion, is called kinetic energy of an object.
- When any object change its position of shape then it store mechanical energy. It is called potential energy.
- There are two forms of mechanical energy:-1. Kinetic energy and 2. Potential energy.
- There are various forms of energy like mechanical energy, heat energy, light, electric, sound, magnetic, chemical, atomic energy, etc.
- Energy can be converted from one form to another form.
- There may be energy crisis for uncontrolled use of conventional energy resources :- wood, coal, petroleum, etc.
- To overcome the energy crisis, the use of non-conventional must be increased and stop the misuse of energy.

Exercises

Choose the correct answer.

1. The unit of energy is -.

(A) Newton (B) Kilogram
(C) Joule (D) Watt ( )

2. The capacity of doing work is called -
   (A) Power (B) force
   (C) momentum (D) energy ( )
3. one of the following is not fossil fuel -
   (A) petrol (B) Wood
   (C) natural gas (D) Diesel ( )
4. Which is the apparatus used to convert electric energy into sound energy -
   (A) Electric motor (B) electric magnet
   (C) electric heater (D) electric bell ( )

Fill in the blanks (with suitable words.)

1. The energy in objects due to its motion, is called .....of an object.
2. The stressing the rubber in sling-shot, the .....energy stored in it.
3. Electric cell, used in house hold, converts.....energy into electric energy.
4. Unit of energy is.....

Match the column (A) and Column (B)

(A) Energy conversation	(B) Instrument
i. Electric energy to sound energy	(A) Solar cell
ii. Electric energy to heat energy	(B) Dynamo (generator)
iii. Mechanical energy to electric energy	(C) Electric heater
iv. Light energy to electric energy	(E) Speaker

Short answer type questions

1. Define work.
2. Which are the things on which work done on the object depend?
3. Give the two-two names of the things which store kinetic energy and potential energy in it on the basis of daily life observation.
4. How do we define the energy conversation? Explain energy transfer on the basis of three different examples.

Long answer type questions:

1. what do you mean by global energy crisis? What are the measures you adopt to resolve the globe energy crisis. Describe it in detail.
2. Explain the differences between conventional energy sources and non-conventional energy sources with providing suitable examples..

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Chapter 10

Sound

Points to Study:

10.1 Origin of sound
10.2 Vocal sound produced by human
10.3 Transmission of sound
10.4 Loudness and pitch
10.5 Audible , infra-audible, ultra-audible sound
10.6 Human ear
10.7 Air polhution

With birth We started to hear different types of sound. The various - different sound are enter in our ears at every moments like- coo-coo of cuckoo, cock of crow, moo of cow, tweet of birds, bells in temple, music of harmonium and sitar, etc. and also do not know many others sounds. Sound is intergral part of our life. Do you know scientific cause of sound production? Let find out.

10.1 Origin of sound

Activity - 1

Make 2-3 small balls from piece of papers and put on inverted plate. Now hit the plate with steel spoon. What do you see? Why do pieces of paper do up-down motion?

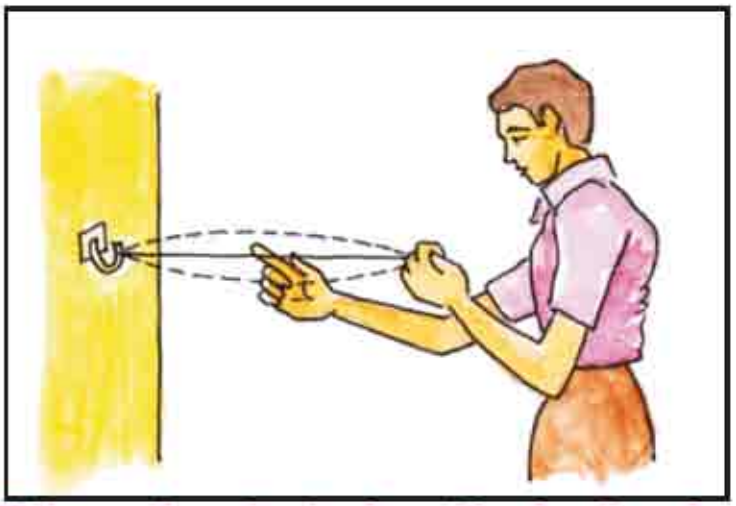


Fig. 10.1 High sound production by rubber band up-down motion.

According to fig 10.1, clamp one end of rubber band on wall with nail and tense it. With the second hand , pull the rubber band from mid and release it. What does sound appear. Observe the motion of rubber band?

If motion of rubber band is stopped. Do you hear sound ?

It is clear from the above activity that after releasing the strained rubber band. It is vibrating up and down. It is called vibrational motion.

The objects produce sound due to vibration.

Similarly, ringing the, drum, tabla, dholak, school bell, etc. and touch it. Does the vibration occur ?

10.2 Vocal sound produced in human:

When we speak then sound generated from our vocal. How does vocal sound generate? Let see by doing.

Activity -2

Take two rubber balloon's strips of size 4 cm long and 3 cm wide. Place these two pieces one above the other and stretch them tight. Now, try to blow quick air through the gap between them from mouth and sound is produced. You may say your friends to see it. Ask to your friend to perform the same activity and you observe it. Strips are continuously opening and closing by blowing the air and sound is producing.

Fig. 10.2 Strips are continuously opening and closing and producing sound with air blowing in these.

Fig. 10.3 Vocal system of human.

In human's throat, there are exist two vocal cords bounded to each other. It is called vocal-fibre. Its structure is shown in fig. 10.3. Our vocal-fibre is natural musical instrument.

When we speak, vocal fibre is stretched in such a way that it becomes think slit. When the lungs force air through the slit, the vocal cords starts vibrating and producing sound. The process is same as in above activity. The Vibrations are produced in rubber strips as shown in fig 10.2.

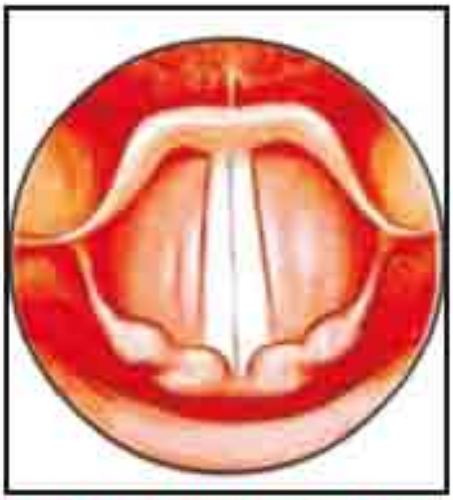


Fig. 10.4 (A) closed vocal system

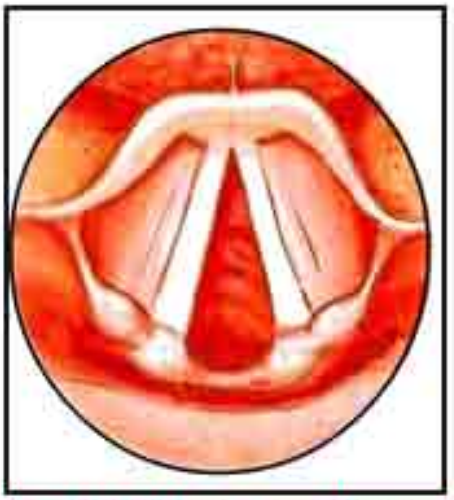


Fig. 10.4 (b) open vocal system

10.3 Transmission of sound

How does sound transmission into different- medium.

(A) Sound transmission in air:

Sound reaches to our ears by transmission through air from location of generation. Sound transmission in air through vibration. When an object is doing vibration then air nearby it also vibrates. Each vibrating particle transmission these vibrations to other particles which comes into contact of these. Similarly, sound vibrations reach to our ears through one air molecule to another air molecules. Air molecules nearby ear-drum vibrate. These oscillating air molecules collide with ear-drum. The ear-drum starts oscillating and we listen sound.

Does sound transmission in solids and liquid ?

(B) Sound Transmission in solid

Activity - 3

Take a metre scale or approximately 2 meter long metal wire and same length thread. Hold one end of meter scale near to your ear and ask your friend to gently scratch the other end of the scale. Can you hear the sound of the scratches? Similarly repeat the same activity for stretched metal wire and thread. Vibrations is produced in solids due to scratching at one end and forwarded to other particle till reached the second end. It is clear that sound propagates in solids also.

In laboratory, we hear sound after putting a vibrating tuning fork near to ear.

Activity - 4

Take two empty match box and make an hole in its inner part. knot a long thread in these holes. Two students hold these match box and move apart to each other. One student hold the match box near to ear and other student speaks in box slowly. This is a toy telephone.

Fig. 10.5 Toy telephone.

(C) Sound Transmission in liquid

Activity - 5

Take a bucket or a bath tub. Fill it with clean water. Take two small piece of stone and scratch these to each other in bucket. Does sound hear to nearby person. Certainly, You will be able to hear this sound. It is clear that sound is transmission in liquids also.

It is straightforward from above discussion that sound propagates in solid, liquid, and gas (air) medium. Sound can not transmission in vaccum. Sound needs a medium to transmission.

Do you know it.

1. Speed of sound is highest in solid, high in liquid and lowest in gas (air).
2. Speed of sound in air at 0°C is 331 m/sec.
3. The two space travellers can not talk to each other at moon. Because, there is no air at moon.

Amplitude, frequency and periodic time

According to fig. 10.6, the vibrating objects displaced form its mean position O' to upper side maximum displacement position A and come back to 'O' and goes lower side maximum displacement position B and again come upward to O. In this way, it completes one oscillation which can be represented as following.

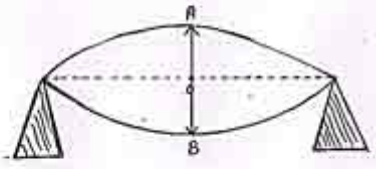


Fig. 10.6 Amplitude of vibration.

$$A \rightleftharpoons O \rightleftharpoons B$$

Amplitude: Maximum displacement from mean position for a vibrating object is called amplitude. Amplitude OA=OB in as shown in fig.10.6.

Frequency : The data related to three vibrating objects are given in table. Fill in the blank by make easy calculation.

Table 10.1

Sr. No.	Object	Number of oscillation completed by an object	Time taken in oscillations	Number of vibrations in one second
1	A	500	10 sec	.....
2	B	400	10 sec	.....
3	C	100	5 sec	.....

Which is the object do maximum number of oscillation in one second? It is apparent that object A does maximum number of oscillation and objects C does minimum.

"Number of oscillation executed in one second is called frequency."

In above table, you find the number of oscillation by division of number of oscillations to time taken in these oscillations. So we can say that frequency can be calculated by following formula-

The international unit of frequency is vibration per second which ia also called Hertz.

Unit of time period is second

$$\text{Frequency} = \frac{\text{Total number of oscillations}}{\text{total time taken}}$$

Periodic time or time period:

Time taken to complete one oscillation is called periodic time. Periodic time and frequency are reverse to each other.

$$\text{Periodic time} = \frac{1}{\text{Frequency}}$$

10.4 Loudness and pitch

Sounds are different from each person, animal, musical instruments. We can recognise the sound through ears on the basis of three characteristics elements. These are three as- loudness, pitch and quality. Here, we discuss only loudness and pitch. Regarding the quality you will read in higher classes. How you define pitch? Let us understand.

(A) Loudness:

Activity -6

Take plate or metal plate other. Hit it with a spoon first slowly and then hardly. In which position you will hear high sound or loudness and in which position softness? You may also have seen the ringing the drum or Tambour. When these hit hardly, then intense or more strong sound will be heared. Whereas when it hit softly then the soft or low intense sound is produced.

Table 10.2

Sr. No.	Pair	Soft sound (low intense)	Loud sound (high intense)
1	Tong and bell	tong	
2	Roar of lion's and buzzing of mosquito		
3	Drum and Sitar		
4	Flute and band-baza		
5	Tasha, anklete		

Identify the group of soft and loud sounds in next table 10.2.

When you speak slowly then low intense or loudness sound come outs. But when you speak strongly then sound comes out high loudness which has high intensity of loudness.

The loudness of sound depends upon amplitude. So we can say that loudness of sound increases as amplitude increases. The international unit of sound is decibel (dB).

Search the examples of soft and loud sound using additional experience of daily life and discuss on it.

(B) Pitch

Activity -7

Ring a tong and a bell . Which has fine or sharp sound and which does it have thick or heavy? Classify the the pair of sound systems into sharp(fine) and heavy (thick) sound based on experience. Search the examples of soft and loud sound using additional experience of daily lifes. In the case of man and woman, normally woman has fine sound whereas a man had heavy sound.

The sound's characteristics of sharpness (fineness) or thickness (heavy) is called pitch. The pitch of sound depends upon the frequency.

The sound of woman's and children's is melodious and fine compared to man's sound due to its high frequency or pitch.

It is clear that high pitch sound has high frequency and low pitch sound has low frequency.

Search reason:

1. Sitar's sound is more melodious than Tambour.
2. Nightingale's (Cuckoo) sound is more melodious between the sound of cuckoo and crow.

Find out the various sounds nearby you and know by comparing these sounds. Which does sound has high pitch and which does sound has low pitch?

Till now discussion, you may able to find the difference between the loudness

and pitch of sound. We can classify the objects on the basis of loudness and pitch e.g the loudness in sound roaring of loin is more compared to buzzing of mosquito but the pitch in sound roaring of loin is less compared to buzzing of mosquito.

You feel also it:

A musical instrument generates varied pitch sounds. You may feel it by pressing the different buttons on harmonium . It generates different pitch (frequency) sound. Is the pitch of sound generated by opening the different holes in flute same?

Try to get feel to change the pitch of musical instrument does you have nearby.

How do you classify the sound on the basis frequency ? Let us know.

10.5 Audible, infra-sonic, ultra-sonic

Our ears are only capable to hear the sound of minimum frequency 20 vibration per seconds (Hertz) and maximum frequency 20,000 vibration per second. The sound having frequency 20 hertz to 20,000 (20 kg hertz)hertz can only heared by us is called audible sound.

What do you call the sounds of frequency less then 20 hertz and more than 20 kg hrtyz?

The sounds of of frequency less then 20 hertz is called infra-audible (infra-sonic) and more than 20,000 hertz is called ultra-audible (ultra-sonic).

Ultrasonic sounds are used in diagnose the diseases through ultrasonography. It is called sonography in normal language.

Infrasonic waves sre used in 'SONAR' device to measure the depth of sea and submarine's position and speed.

Warning : Sonography is used to check the health and growth of infant child in the womb of pregnant woman. Few people are identifying the sex of child during checking and make abortion if the infant child is girl. It is called embryo death. In our country, it is legal crime to check an embryo for sex determination and help in this activities. In society, girl child has equal right to live .

Lets know it

Some animals can hear ultra-audible sound like - dogs, bats, rats, whale, etc. Police uses the ants which generate ultra-audible to train the investigating dogs. The bat generates ultra-audible sound and hear the reflecting ultra-audible sound and get information about the obstacle. That is why, the bats can easily fly in dark night

10.6 Human ear

The shape of the outer part of the ear is like a funnel. It is called Pinna. When sound enters in it, it travels down a canal . It is called hearing cavity. At the

end of hearing cavity a thin membrane is stretched tightly. It is called the ear-drum. It is also called tympanum in normal language.

When the vibration of sound vibrates ear drum then ear dumsends vibration to the inner ear. It performs an important function. To understand what the eardrum does, let us build a tin can model of the eardrum. From there, the signal goes to the brain. That way we hear.

Let do it also.

Activity - 8

To understand the process of eardrum vibration. Let perform the following activity. Take a paper glass. Cut its ends. Stretch a piece of rubber balloon across one end of the glass and fasten it with a rubber band. Put four or five small pieces of ther mocol on the stretched rubber. Now ask any student to speak few words from the open end Observe what happens to the pieces. Why do the grains jump up and down?

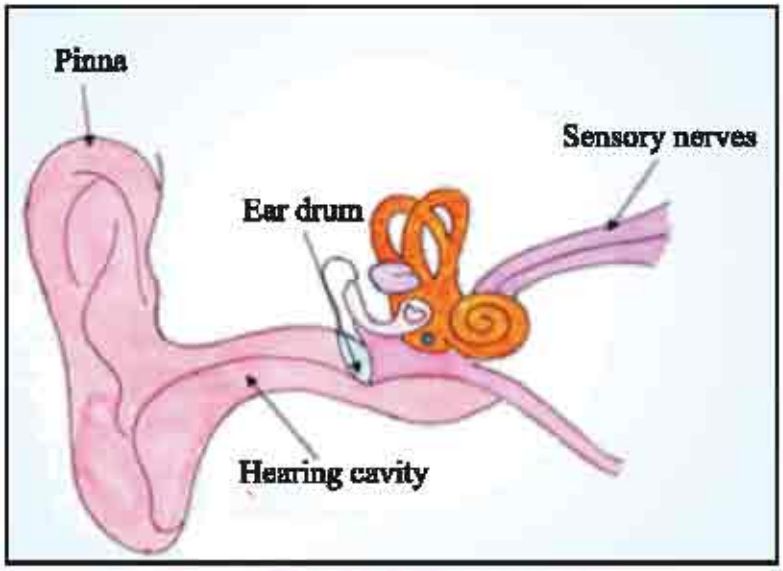


Fig. 10.7 Human ear

10.7 Sound Pollution

Classify the sounds heared in daily experience by you into pleasant and non-pleasent catagories.

Melodious sounds are pleasent to ear. Musical sound is one which is pleasing to the ear. The sounds which are unpleasant to ear are called noise e.g. sounds produced by transports vehicles, music with high loudness, sounds coming from the construction, etc.

Low sounds as normal breathing has loudness upto 10 decibel, soft whisper has loudness 20 -30 decibel, radio music (normal form) has loudness 50 -60 decibel.

The loudness of sound is upto 50 decibel then we feel it as pleasant sound. We can bear 50-80 loudness sound e.g. light vehicles, noise by students, normal music. The loudness of sound is more then 80 decibel then it becomes unbearable sound even though, it is melodious music.

The sound pollution is occurred due to continuously high noise by motor vehicle sounds, rail engine sound, factories, loud speakers, etc. The daily

routine activities are affected by noise pollution. The lot of health related problems are generated e.gmoreseness, sleeplessness, high blood pressure, temporary or permanent loss of hearing capacity and becomes deaf rarely.

Measures to limit noise pollution

1. The silencing devices must be installed in transport vehicles, industrial machines and home appliances.
2. The noisy operations must be conducted away from any residential area.
3. Television and loudspeaker should be run at low volumes.
4. Trees must be planted along the roads and around buildings to observe the sounds

let you know also it.

Indian music system is purely scientific. It has seven musical surs - Sa, Re, Ga, Ma, Pa, Dha, Ni. Musicians are used these swaras to produce melodious sound /music. Indian music system has different which are based on these tones surs.

□□□

What you have learnt

- Sound is produced by vibrating objects.
- In human beings, the vibration of the vocal cords produces sound.
- Sound travels through a medium (gas, liquid or solid).the speed of sound is highest in solids, high in liquids and lowest in gases.
- Sound cannot travel in vacuum.
- The number of vibrations per second is called the frequency of oscillation.
- The time taken to complete one oscillation is called the time period or vibration period.
- The loudness of sound depends on amplitude of vibration. Larger the amplitude of vibration, louder is the sound.
- The properties of sounds like Sharp (fine) or heavy (think) are called pitch of sound. Higher the frequency of vibration, the higher is the pitch.
- We can hear the sound from 20Hz to 20000Hz. It is called audible sound.
- The sounds having frequency less than 20Hz is called infra-sonic and more than 20000Hz (20 kilo hertz) is called ultra-sonic.
- Sound produces vibration in eardrum. It send to brain through ear – cavity by which we feel sound.
- Unpleasant sounds are called noise.
- Noise pollution may create many problems. So we should attempt to minimise noise polhution.

□□□

Exercises

Choose the correct answer.

1. In which medium, the Transmission of sound is not possible?
   (A) Iron rod (B) water
   (C) air (D) vaccum ( )
2. The up-down motion around the mean position of an object is called -
   (A) Vibration (B) Amplitude
   (C) Frequency (D) Periodic time ( )
3. Speed of sound at 0 °C in air is -
   (A) 350 m/sec (B) 200 m/sec
   (C) 400 m/sec (D) 331 m/sec ( )
4. Time taken to complete one vibration is called -
   (A) frequency (B) time period
   (C) amplitude (D) non of these ( )

In the following statements, tick T against those which are true, and F against those which are false:

1. sound generates due to vibration in objects. True/false
2. The sound waves do not need medium to Transmission. True/false
3. The sound has maximum velocity in solids. True /false
4. The unit of loudness of sound is decibel (dB). True / false

Fill in the blanks with suitable words.

1. Main source of sound in human is.....
2. The sound wave of having frequency more than 20000 hertz is called.....
3. The international unit of frequency is .....
4. The loudness of sound depends on .....
5. The pitch of sound depends on.....

Short answer questions

1. A musical instruments takes 2 seconds to complete 200 oscillations then calculate frequency of it ?
2. The ringing bell in a temple has frequency 400 vibration/sec, then calculate the periodic time of it.

3. What are differences in audible, infra-audible, ultra-audible.
4. Define frequency and periodic time ? Represent the relation of them by a formula.

Long answer questions:

1. Draw an human vocal system diagram and explain its working principle.
2. What is noise pollution. How does it affect us ? How can it controlled? Explain it in detail.
3. Explain the process of receiving the sound signals to brain with labelled diagram of human ear.
4. How does sound Transmission in solids, liquids and gases? Explain it.

Activity work:

1. Prepare a chart of human ear and hang in class room.
2. Prepare the charts for representation of sound pollution and its effects and to control it. Develop the awareness in school and villages by showing the charts.
3. Take a flute and produce different sounds by closing 1,2,3 ...hole by finger and compare its pitch.
4. Prepare the charts by knowing about musical instruments of Rajasthan.

◆◆◆

Chapter 11

Effects of Electric Current

Points to Study:

11.1 Heating effect of electric current
11.2 Fuse
11.3 Magnetic effect of electric current
11.4 Electromagnet
11.5 Electric bell
11.6 Chemical effect of electric current
11.7 Electroplating

There are many apparatus for daily use in our homes . These are based on electric e.g - electric press, electric heater, electric oven, electric bulb, electric bell, electric toaster, etc. In modern days, our life without electric based appliances is not convenient. You may see that electric appliances become hot when electric flows through it. whereas electric bell produces sound when electric flows through it.

How does sound, heat, etc. produced due to electric flow?

Let us understand. What are the effects of electric current

11.1 Heating effect of electric current

Lets perform the following activity to understand the heating effect of electric current.

Activity-1

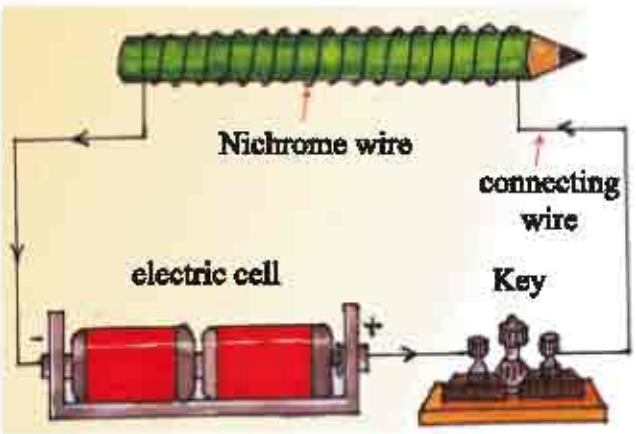


Fig 11.1 Heating effect of electric current

Take thin nichrome wire and wrap it on pencil as shown in fig 1.1. You can get nichrome wire from electric repair shop or you may use electric heatrer wire element. Connect the one end of nichrome wire with cell and other end with key. Connect the electric circuit as in fig.

After plug in key , the electric current flows through the circuit. Now, touch the wire.

Why does the wire heat up?

Now, stop the electric current in the circuit. And wait for some time and touch the electric wire. The wire becomes cool.

"The wire gets hot when an electric current passes through it. This is the heating effect of the electric current."

All the appliances are shown in fig 11.2 are based on heating effect of electric current.

Explain the use of each appliances and make a list of other appliances based on the heating effect of electric current.

Fig 11.2 Appliances based on heating effect of electric current

11.2 Fuse

Fig 11.3 Electric socket

Three types of wire are used to supply electricity in our homes. Whenever the electricity supply does not comes in our homes we call the electrician to rectify it. You must have seen that mechanic check the electric supply by a tester. There are three holes in socket. The socket's end in which tester is inserted and lighted is called **electric** live wire or **phase**. Normally, red coloured plastic wrapped wire is used as phase wire in household electric circuits. The socket's end near the phase socket in which tester is inserted and does not produced light is called **neutral wire.** The neutral wire is at zero voltage. Normally, black coloured plastic wrapped wire is used as neutral wire. There is 220V electric supply between these two wires. The third wire is used for **Earthing** wire and green coloured plastic wrapped on it. Earthing wire is connected with copper plate underground the earth. The earthing wire is safety measure to protect the person form electric shock during use of it in the case of phase wire is touching in metallic body of appliances.

Short circuit: The phase wire and neutral wire connect to each other directly by any mechanism is called short circuit. High electric current flows in circuit during short circuit. Due to over-heating, the appliances may catch fire or burn. The excess connections into socket may cause of the high flow of electric current in circuit. It is called overloading of circuit. So, we should not plug in more devices into a single socket.

Causes of short circuit:

1. When the electric current flows excess to safety limit through the circuit then wire becomes hot and plastic around the phase wire melts. Due to that phase wire and neutral wire come into contact and short circuit happen.
2. In addition of it, when the wires are too old , then its plastic envelop becomes weak and break. It may cause for short circuit.

Losses of short circuit:

The excess electric current passes through electric circuits due to short circuits. As a result the appliances are become hot and catch fire and may be cause for fire accident.

What do we do to protect from an accident or damage to an appliances?

To protect the damage to an electric appliances, a device is connected in series which melts when electric current exceeds the safety limit and electric currents flow stops in circuit. The device is called **Fuse.**

Normally used fuse are shown in fig 11.4. Nowadays, TV, fridge, and other. costly electric appliances have special fuse with internal circuits (as fig. 11.4 (b)).

How does fuse works?

If there is flow of excess electric current to specified value in circuit, then fuse wire may get increase in temperature. Due to that fuse wire becomes melt and electric circuit broke. Normally fuse wire ends kept in porcelain or similar insulator material cartridge.

Fig 11.4 (a) Normal fuse

Fig. 11.4(b) Special fuse

Normally fuse wire is made of mixed metals e.g. copper, zinc and tin. It has low melting point compared to wires used in electric appliances and electric circuits. Whenever electric currents exceed the safe limit due to overloading or short-circuit, the fuse wire melts and breaks. The resultant, the flow of electric current in circuit is stopped.

Why does the fuse wire connect after electric meter and before electric circuits? Explain it.

Precautions:

Do not make an effort to check the fuse wire connected in main line on yourself. It may be dangerous. To know about it. You may visit to electric circuit repair shop and compare the damage fuse wire with new fuse wire. We should use ISI marked fuse wire. Do not use any metal strip or wire in place of fuse wire. It may big danger to catch fire in home.

Also know about it.

Miniature circuit breakers (MCBs)

These days Miniature circuit breakers (MCBs) are used in place of fuses. These are switches which automatically turn off when current in a circuit exceeds the safe limit. when you turn ON them, then circuit is once again completed.

Fig. 11.5 Miniature circuit breakers (MCBs)

11.3 Magnetic effect of electric current

Take a magnetic needle and make rest in position. Now, bring magnet bar near to it. does magnetic needle deflect?

Can magnetic needle being deflected by an electric current?

Activity-2

Take the cardboard piece and make two holes at a few distance to each other. Put a magnetic needle or compass as shown in fig 11.6.

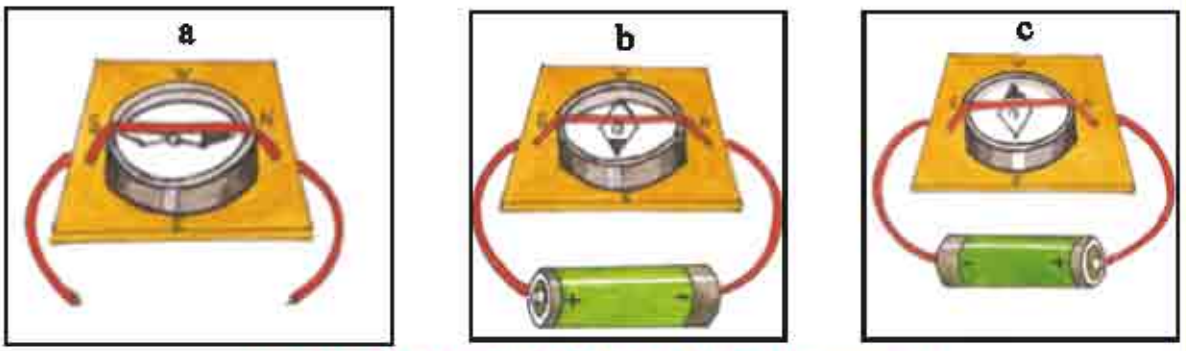


Fig. 11.6 Magnetic effect of electric current.

Now, adjust the cardboard in such a way that we see the compass needle beneath the wire from top view. As shown in fig. 11.6 (a). Now, you observe the deflection in magnetic needle in following situations-

1. Connect the free ends of wire to cell as in fig 11.6 (b). what do you observe? Does the magnetic needle deviate?
2. What do you observe when the wire connections are reversed ? Does the magnetic needle deviate in other direction?
3. What do you observe when the wire connections are disconnected in both above situations ? Does the magnetic needle come again in its initial position ?

You will find that magnetic needle deflects when it put nearby the electric current passing through wire. By these observations, **Oersted** discovered the magnetic effect of electric current.

" When electric current passes through a wire, it acts like a magnet. This is the magnetic effect of the electric current."

electric bell, electric crain, telephone, telegraph, etc are working on it. The electromagnet are used in these appliances.

How do we construct the eletromagnet? Let us do it.

11.4 Electromagnet

Activity-3

According to fig. 11.7 , take approximately 10 to 15 cm long iron nail and 50 cm long thin copper wire covered in insulation (enamelled) .

Remove the enamel from the both the ends of wire by scrubbing it with sand paper. Now, wrap the wire on nail with two ends are open and connect to battery and key as shown in figure to complete the electric circuit. If there is no pressed key and you move allpin near to nail. What do you see? Does the allpin attract towards nail?

In this situation, when there is no current passing through the electric circuit then there is no attraction force feel by the nail and allpin.

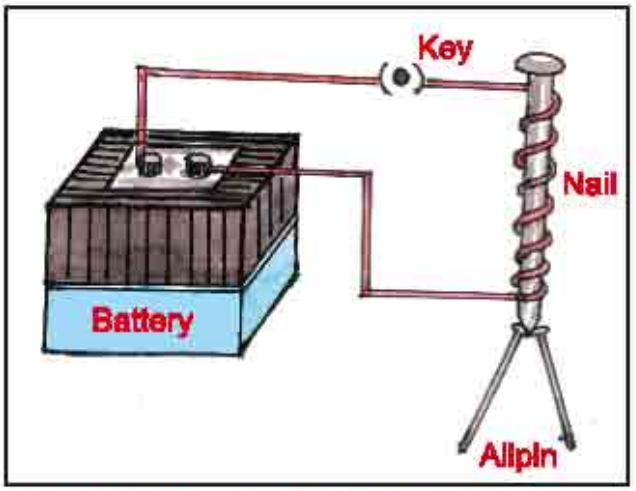


Fig. 11.7 Magnetic effect of electric current.

Now, press the key and electric current passes through the circuit. Take allpin near to nail. What do you see? Why does the allpin stick with nail?

The electric current is passing through the copper wire wrapped nail then it behaves like magnet. It is called electromagnet. What will happen on allpins attached to nail if we remove the key from circuit? and why?

The electromagnet is used in electric bell. How does electric bell work?

Let's know about it.

11.5 Electric bell

The electric bell has following elements as shown in fig 11.8.

1. Coil 2. Iron strip 3. contact screw 4. hammer 5. bell

The coil has wrapped the many number of insulation covered copper wire turns on iron core. An iron strip attached with hammer at the one end is attached nearby coil. There is a contact screw near the iron strip.

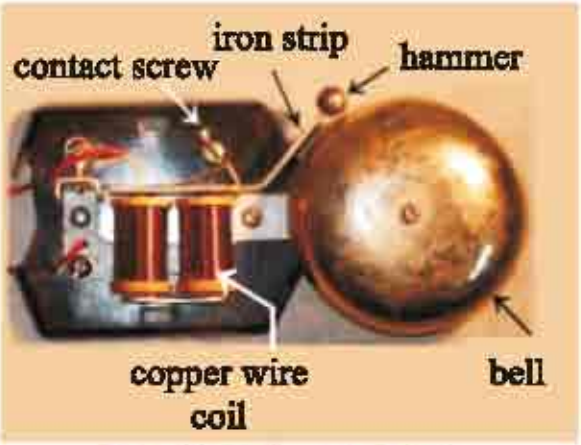


Fig. 11.8 Electric bell.

When electric switch is on, the electric current flows through the coil. Due to magnetic effect of electric current, it becomes an electromagnet. Then it attracts the iron strip. In the process, the hammer at the end of the strip strikes the gong of the bell to produce a sound. When the electromagnet attracts the iron strips then screw does not remain in contact to it and the circuit breaks. The current through the coil stops flowing. The coil does not remain an electromagnet.

The iron strip comes back to its original position and touches the contact screw again. This completes the circuit. The current flows in the coil and the hammer strikes the gong again. This process is repeated in quick succession.

Application of electromagnet:

1. Electromagnet is used to collect the magnetic materials from the scrape.
2. Electromagnet is used by the doctor to draw pieces of magnetic material fallen into eye accidentally.
3. Electromagnetic cranes are used to lift heavy iron objects.

Electric conductivity in liquids:

We have learnt that the solids materials are good electric conductor e.g. copper, aluminium, iron, silver, etc. whereas, the other solids which do not flow the electric current easily are called electric insulator e.g rubber, plastic, wood, etc. Does the liquid solutions also electric conductor?

Activity-4

Take empty match boxes as tray and put a magnetic needle. Now wrap the enamelled copper wire on on it. As fig 11.9 Connect the one end of wire with one battery terminal and leave other end free. Connect the second terminal of battery with another wire and leave it end free too. Now, connect these two free ends then magnetic needle deflects. Similarly a tester has two free ended wires.

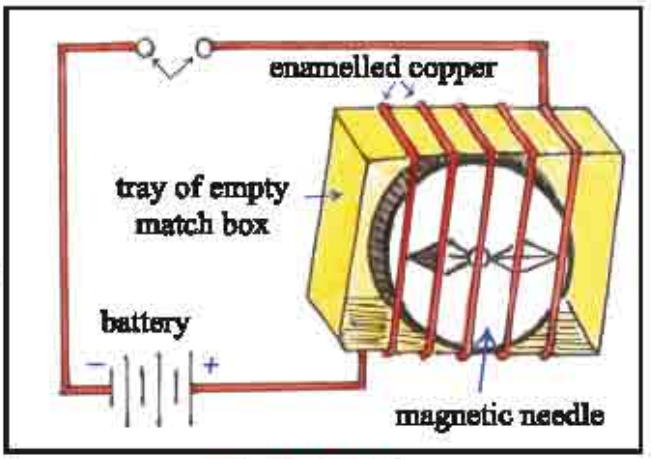


Fig 11.9 Tester

Now fill the pure water in dry plastic cap and immerse these two wires into it. Does the pure water conduct electric? Now pour a little amount salt in pure water. again test it what do you conclude?

Repeat the similar process with different liquid solutions and see the deflection of magnetic needle in each situation. Does magnetic needle deflects or not?

Put your observation into following table.

Table 11.1

S.N.	Matter	Magnetic needle deflects or not?	Conductor or Insulator
1	Pure water	No	insulator
2	Juice of lemon	YES	conductor
3	Sirka (vinegar)		
4	Tap water		
5	Vegetable oil		
6	Milk		

We see that most of liquids, which are easily conduct electric current, are solutions of acids, bases, and salts.

11.6 Chemical effect of electric current

When a electric current passes through the conducting solution then does it produce any effect in solution?

Let us do an experiment.

Activity-5

Take out carbon rods carefully from two discarded cells. Clean their metal caps with sand paper. Wrap copper wires around the metal caps of the carbon rods and join them to a battery. We call these two rods electrodes.

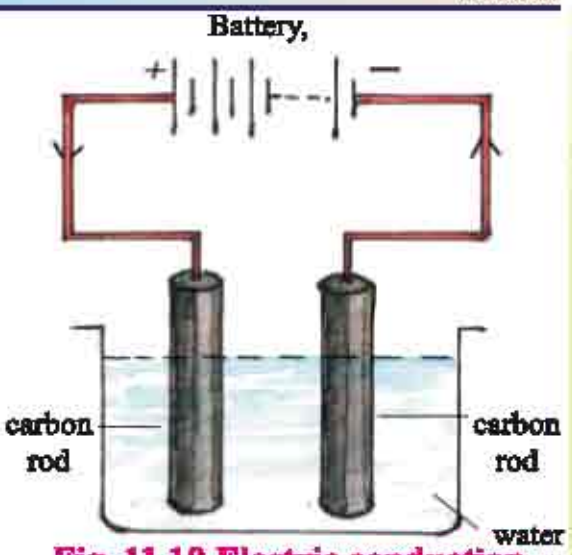


Fig. 11.10 Electric conduction in liquid

The plate connected to positive terminal of battery is called anode whereas the plate connected to negative terminal of battery is called cathode. In the symbol of electric cell, long line represents positive terminal and small line represents negative terminal.

Now immerse the electrodes in glass/plastic bowl filled with water - lemon juice or water salt solution as shown in fig. 11.10 . Make sure that the metal caps of the carbon rods are outside the water. Wait for 3-4 minutes. Observe the electrodes carefully. Do you notice any gas bubbles near the electrodes?

The changes are taking place in the solution. Can we call it a chemical change?

The passage of an electric current through a conducting solution causes chemical reactions. As a result, bubbles of a gas may be formed on the electrodes. Deposits of metal may be seen on electrodes. Changes of colour of solutions may occur. The reaction would depend on what solution and electrodes are used. These are some of the chemical effects of the electric current.

11.7 Electroplating

Due to chemical effect of electric current, the conducting solution dissociates into its constituent elements. It is used in electroplating. Let us understand it by an experiment.

Activity-6

Take copper sulphate solution into clean and dry beaker. Take two 10cm × 4cm copper plates. Clean these plates by scrubbing the sand paper and wash with clean water. put these for drying. Now connect these plates to the terminals of battery via connecting wires and immerse them in copper sulphate solution as shown in fig. 11.11.

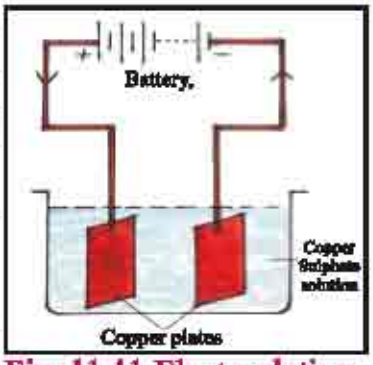


Fig. 11.11 Electroplating

Allow the current to pass for about 15 minutes. Now remove the electrodes from the solution and look at them carefully. Do you find any difference between

negative terminal of battery.

Do you find any layer over negative terminal plate?

When copper sulphate is dissolve into water, copper sulphate dissociates into copper and sulphate. The free copper gets drawn to the electrode connected to the negative terminal of the battery and gets deposited on it. But what about the loss of copper from the solution?

From the positive terminal electrode, a copper plate, an equal amount of copper gets dissolved in the solution. Thus, the loss of copper from the solution is restored and the process keeps going. This means that copper gets transferred from positive terminal plate to negative terminal plate during the process of electroplating.

> " The process of deposition a desired metal on any material by electric is called electroplating."

It has wide application in industries. For examples- to deposit a layer of silver or gold on ornaments, chromium platting on few portion of car, bathing tap, gas burner, cycle's handle and rim, etc., to protect from rusting and corroding the iron, the zinc layer is deposited on iron.

What have you learnt

- When the electric current passes through the conducting wire. It becomes hot. It is called heating effect of electric current.
- The high electric current is passing through the special mixed materials wires e.g. copper, zinc, lead, tin etc. it becomes hot and start to melt and breaks. These materials are used in making fuse wire which protect to damage and fire in electric circuit.
- When an electric current flows through the conductor, then conducting wire behaves like magnet. It is called the magnetic effect of electric current.
- The insulation covered conducting copper wire wrapped in circular form on any piece of iron is called electromagnet.
- Few liquids are good electric conductor and few are bad electric conductors.
- The most of liquids, which are electric conductors, are acid solutions, base solutions and salts solutions.
- When electric current passes through any conducting solution. It dissociates into its constituents. It is called chemical effect of electric current.
- The process of deposition a desired metal on any material by electric is called electroplating.

□□□

Exercises

Choose the correct answer.

1. Electric bell is based on which electric current effect ?
   (A) thermal effect (B) magnetic effect
   (C) chemical effect (D) Joule effect ( )
2. Which is the object used to collect the magnetic matter from scrape?
   (A) electric magnet (B) electric cell
   (C) Fuse (D) Immersion rod ( )
3. Which is the following solution not pass electric current?
   (A) Copper sulphate (B) Silver nitrate
   (C) pure water (D) salted water ( )
4. Which is not a component of electric bell ?
   (A) strip of iron (B) coil
   (C)contact nut (D) magnetic niddle ( )

Fill in the blanks with suitable words.

1. The long line represents.....and short line represents..... terminal of electric battery's symbol.
2. The saftey device based on heating effect of electric is called .....
3. In battery, the plate connected to positive terminal is called ..... and to negative terminal is called.....
4. The magnetic effect of electric current is discovered by .....

Short answer questions

1. What is the fuse?
2. Write any three applications of electromagnet.
3. What is thermal effect of electric current? Write down the names of any four appliances based on this effect.

Long answer questions:

1. Make a diagram of electric bell and explain its working system.
2. What is the chemical effect of electric current? Explain the process of electroplating.

Activity work:

1. Try to stop the electric misuse in our household appliances and make public awareness about the saving of electric in street or villages, etc.
2. Make a model which represent the magnetic/ chemical/ thermal effects of electric current.

◆◆◆

Chapter

12

Artificial Satellite

Study Points:

12.1 Artificial satellite
12.2 Artificial satellite launching
12.3 Types of artificial satellites
12.4 Use of artificial satellite
12.5 Main artificial satellites of India
12.6 Indian space research organization.

You know that in our solar system eight planets - Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune, are revolving around the sun. Similarly, some objects are also revolving around these planets are called satellite. These satellites are natural satellites for example - Moon is earth's natural satellite. Can man also made any satellite? Let us know about it.

12.1 Artificial satellite

The man-made satellites which are revolving around the earth or other planets are called artificial satellites. These are different from natural satellites.

Today you are using the television, radio, mobile, etc. all these are working due to artificial satellites. The powerful telecommunication on earth has become possible only due to artificial satellite.

12.2 Artificial satellite launching

How do these satellites sent into space and how do these remain there? Let us know about it by doing an activity.

Activity-1

Take objects like ball, stone, rubber, duster, etc. and throw them upwards one-by-one. Observe all the things and tell that in which direction all these objects move. We see that all the objects reach at certain eight and return back to earth. These observations indicate that earth attracts these objects. Due to this attraction of earth all objects thrown upwards return back to earth. This effect is called gravitational attraction.

Fig 12.1 Satellite launching

The artificial satellites are sent into space in this way, does the earth attract them due to earth's gravitational attraction? Then, in what way the artificial satellite is to be sent into space, so, it never returns to earth?

Let us try to understand this by following activity.

Activity-2

Take a ball and throw it upward slowly and observe it. You will see that it reaches at certain height and returns towards earth. Now, again throw it upwards with more velocity and observe the distance covered by it. Again throw it upwards with much more velocity and observe the distance covered by it. We note that with increase in upward velocity, the distance (height) covered by object.

The bullet fired by the gun, rockets in crackers etc. have high velocity when these are fired upwards. So, these objects reach at more height compared to objects throw by hands, and return back to earth. Similarly, if we can provide an object with such high velocity by the high quality rocket, then it crosses the earth's gravitational attraction and will never return to earth.

> "The minimum velocity on earth by which the object is thrown upwards and crosses the earth's gravitational attraction, is called escape velocity. It is 11.2 km/sec for any object on earth."

So, if any object thrown upwards with a velocity more than escape velocity, it goes into space. But if any object thrown upwards with a velocity few less than escape velocity then it does not cross the earth's gravitational attraction and revolve in certain orbit around the earth. It is called artificial satellite. The artificial satellites are sent into space by rocket or satellite launching vehicle.

12.3 Types of artificial satellites

There are two types of man-made satellite based on distance of satellite related to earth in space and application of satellite. These are (1) Geo-stationary satellite and (2) polar satellite.

Geo-stationary satellite:

We know that each satellite revolves around the earth in a certain orbit. Any satellite which revolves around the earth seems stationary on viewing from a certain position on earth, is called geo-stationery satellite. This satellite positioned at 36000 km upward distance from earth surface. It revolves in equatorial linear orbit.

> **Let us know about it**
>
> The time period of revolution of Geo-stationary satellite is 24 hours which is equal to rotation period of earth. So, the geo-stationery satellite also revolves around the earth from west to east in 24 hours in its own orbit. That is why it seems stationary viewing from earth surface.

Fig 12.2 (A) Geo-stationary satellite

Fig 12.2 (B) Collection of data through satellite dish positioned on school.

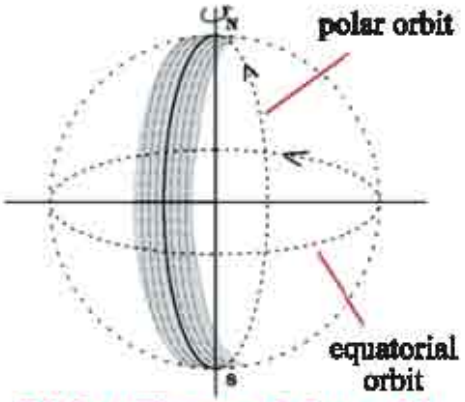
Geo-stationery satellites are used in, satellite telephones, satellite televisions, satellite radios, etc., for worldwide telecommmunication. That is why, geo-stationery satellites are also called telecommunication satellite.

Polar satellite:

Satellite which revolves in polar orbits of earth is called polar satellite. Polar satellites revolve at less height from the earth surface. The satellite's distance from earth's surface is 500 to 800 km approximately.

The many important information like images of clouds, information about atmosphere, hole in ozone layer, etc., are collected by polar satellites. The information collected by polar satellites are used in remote sensing, whether science, environmental study, etc. The important thing is that a polar satellite can observe earth's whole surface, once or twice a day through its camera.

Fig. 12.3 a) Polar satellite



(b) Satellite revolving orbit.

To get information about the object without direct contact to the object, is called remote sensing.

Kalpana Chawla

(March 17, 1962 – February 1, 2003)
First Indian lady space traveller who died in space shuttle of Columbia during returning back.

Fig. 12.4 Kalpana Chawla

India has launched many remote sensing satellites namely - IRS-1A, IRS-2B, IRS-3C, etc. How do we get the signals on radio, television, mobiles, etc. through the satellites? Let us know about it.

See the fig. 12.5 and discuss among each other and tell how is communication arrangement taking place through artificial satellite?

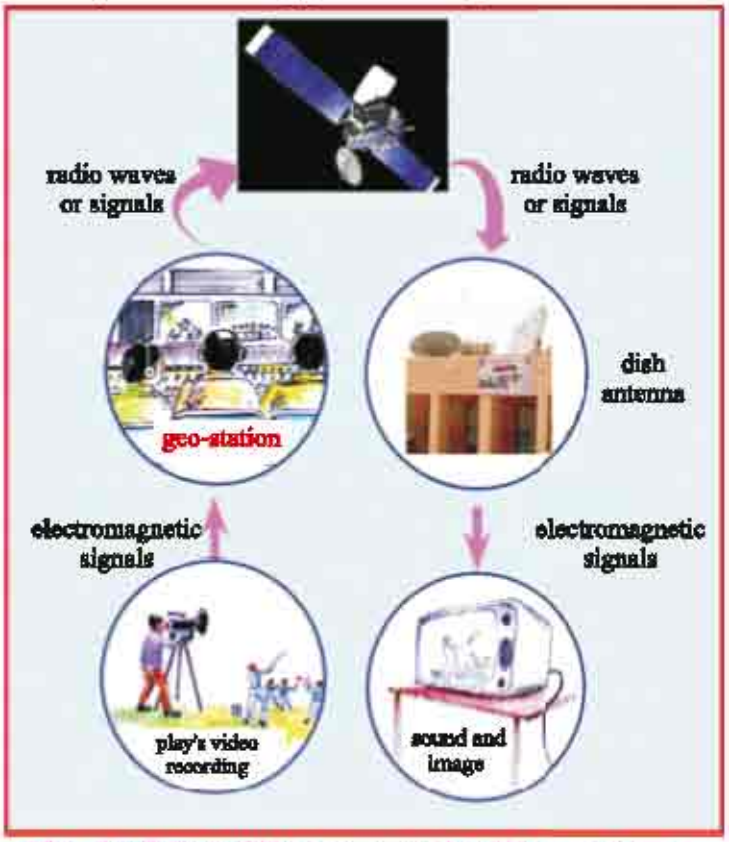


Fig. 12.5 Satellite communication system

Note : microwaves and radio waves can propagate in vacuum or without any medium.

12.4 Uses of artificial satellite

Artificial satellites are very useful to us. In many areas we are getting information and facility using artificial satellites. For example:-

1. Telecommunication means - Telephone, Mobile, Television, Internet, etc. receives signal from different locations on earth and transmit it to another position of earth.
2. To obtain the information about the data collected from meteorological and geological areas.
3. To estimate the crop area and production.
4. To provide warning about the drought and flood and to estimate the loss from these calamities.
5. To discover underground water reservoir and water management.
6. To identify the mineral in geological repositories.
7. To assist the forest conservation by surveying the forest areas.
8. To monitor the airports, sea ports, and defence post, etc. So that it preserve the security management easily.
9. To spy monitoring of army activities.
10. To get information about the events happening in space and atmosphere.
11. To identify the exact location of aeroplane, ship, person, and object.

12.5 Main artificial satellites of India

Now-a-days, the satellites are sent into space for different purpose by the many countries of world. First artificial satellite was sent into space on 4th October, 1957 by Russia. After that many individual satellite sent into space by many countries. Now-a-days, earth has more than 3000 artificial satellites.

The first artificial satellite was sent in space in 1975 by India. Since then, many than 70 different types of satellite have been sent into space by India. These satellites are sent by different space shuttles. Most of Indian satellites are sent in space through America, Russia, European satellite-launching rockets and space shuttles.

Fig. 12.6 Aryabhatt

The main satellites are sent into space, with the help of Indian Space Research Organization (ISRO), of India. These are following -

1. First Indian artificial satellite was "Aryabhatt". It was named on famous ancient Indian mathematician "Aryabhatt".

It was launch into space in April 19, 1975 through Baikonur space station of European union. Its main purpose was to study the earth atmosphere.

2. After that, in 1979, Bhaskar-1 was sent into space which was the India's first experimental satellite in remote sensing area.
3. At the end of 1980, India has started to launch polar satellite into space. These are named as Indian remote sensing satellites i.e. IRS series satellites. These are used for natural resource management, survey, climate forecasting, and space application.
4. In starting of 1980, The INSAT series satellites were launched into space with the help of European launching vehicle. These are used to gather information about weather and telecommunication.
5. ISRO has launched a satellite on February 5, 2003 for obtaining information about weather. It was named as Kalpana-1 in memory of first Indian space traveller Kalpna Chawla. It is first satellite which is related to weather science.
6. India launched its first educational satellite EDUSAT in 2004 (http://isro.gov.in)

12.6 Indian Space Research Organization

Indian National committee for space research (INCOSPAR) was called by Department of Atomic Energy in 1962 led by famous scientist Homi Jahangir Bhabha. It was re-established in 1969 as ISRO (ISRO - Indian Space Research Organization). In India, manufacturing of satellites, development and launching are done by ISRO. Dr. Vikram Ambalal Sarabhai is credited to start Indian space programme.

Fig. 12.7 Eduset

Space and planets related research and development works are being carried out with the help of space based experiments done by ISRO. Dr. A.P.J. Abdul Kalam played a vital role in manufacturing of Indian satellite launching vehicle during working on many important projects of ISRO. Nowadays, India become self-reliant in manufacturing of the high standard satellite launching vehicle. America and other countries also use Indian satellite launching vehicles to launch their artificial satellite. ISRO has launched more than 50 satellites of other countries.

ISRO's centres are in all over India. Its main launching centre is at Shri Harikota (SHAR), Chennai. National centre for space related research is Physical Research Laboratory at Ahmedabad (PRL). Vikram Sarabhai Space Centre is located in Thiruvanthapuram. A remote sensing centre is also located at Jodhpur, Rajasthan, to study the obtained maps, information and other data, etc., from artificial satellites.

Dr. Vikram Ambalal Sarabhai

Dr. Vikram Ambalal Sarabhai was born on August 12, 1919 in Ahmedabad, India. He was main scientist of India and was honoured with 'Padma Bhushan' in the field of science and technology by the government of India in 1966.

Vikram Sarabhai made recognistion of India on world fame. He received his doctrate on " Cosmic ray physics" from Cambridge (U.K.). He wrote 86 scientific research paper and established 40 institutions in the different filed. Among them for space research are Vikram Sarabhai space centre, Thiruvananthapuram and space application centre Ahmedabad. Dr. Vikram Sarabhai was a scientist, visionary, industrial manager and also having interest in music, photography, fine arts. Dr. Vikram Sarabhai died on 30 december, 1971 in the age of 52 years. Posthumously he was honoured by the "Padma Vibhushan"

Dr. A. P. J. Abdul Kalam

Dr. A. P. J. Abdul Kalam was born on October 15, 1931. Dr. Kalam, as a scientist and engineer, was involved in many important projects of defence research and development organization (DRDO) and Indian space research organization (ISRO).

During the work in ISRO he played a major role in development of India's first indigenous Satellite Launching Vehicle (S.L.V. - 3) and with help of it in july 1980, the Rohini satellite was sucessfully established in near earth's orbit. In this way, India also became member of the **'International space club'**. Dr. Kalam had special contribution in missile development program of India. That is why, Dr. Kalam also known as " Missile man ". Dr Kalam was aslo 11th president of India. In addition to education work, Dr. Kalam had written many books. The Government of India had honoured him with Padma Bhushan, Padma Vibhushan, Bharat Ratna, and many others prizes. Dr Kalam died on July 27, 2015 in shillong, Meghalaya.

What have you learnt

- Man-made objects revolve in a certain orbits around the earth or other planets are called the artificial satellites.
- The minimum velocity by which an object thrown upwards and crosses the gravitational attraction forever, is called the escape velocity.
- The escape velocity for earth is 11.2 km/sec.
- The satellite which is seen at fixed position viewing from same location is called geo-stationary satellite. The geo-stationary satellite is also called communication satellite.
- Those satellite revolve in polar orbits of earth is called polar satellites. The polar satellites send information's and data related to climate, geology, earth-water, etc. over passing through various positions at different times and locations in a day.

- The artificial satellites proved their utility in telecommunication sector, climate information and warning alerts, scientific research, to identify water and minerals geological repositories, surveying the forest areas, spying, identifying the location of person and mobile, etc.
- The first Indian artificial satellite ' Aryabhatt' was launched in April 19, 1975 from Baikonur space centre of earlier Europian union.
- Indian space research organization (ISRO) is doing an important work in manufacturing and developing of artificial satellite and satellite launching vehicles and also satellite launching and space science.

Exercises

Choose the correct answer.

1. If any object is thrown upwards with velocity more than 11.2 km/sec then the object will -.
   (A) Return to earth (B) revolve around the earth
   (C) Went into space (D) Non of the above ( )
2. The name of first Indian artificial satellite launched in space is -
   (A) Bhaskar -1 (B) Aryabhatt
   (C) Kalpana -1 (D) INSAT - 1 ( )
3. The satellite is used for communication is called -
   (A) Polar satellite (B) S.L.V.
   (C) Geo-stationary satellite (D) I. R. S. - 1 ( )

Fill in the blanks with suitable words.

1. The minimum velocity by which an object thrown upwards it crosses the gravitational attraction of earth is called as.....
2. Geo-stationary satellite revolves .....orbit of earth.
3. The first Indian artificial satellite .....was launched in April 19, 1975.

Short answer questions

1. Explain the difference between the artificial satellite and natural satellite.
2. The objects, which are thrown upwards from earth, return back to earth whereas artificial satellite does not return back. Why?
3. Differentiate between geo-stationary satellite and polar satellite on the basis of orbital motion, distance from earth and its uses.

Long answer questions:

1. What do you mean by artificial satellite? Write its uses.
2. Write down any five Indian satellite's names, launching year and their uses.
3. Describe the various types of artificial satellites.
4. Write an essay on contribution of Indian space research organization in Indian space programme.

Activity work:

1. Prepare a scrap book by collecting the news, diagrams, other essays about the artificial satellite with the help of newspapers, scientific journals, and internet, etc.
2. Write an essay on ISRO's work, achievements, and targets. (htts://isro.gov.in)
3. Make a list of major Indian space research centres and their places (htts://isro.gov.in)
4. Prepare a chart of Artificial satellites sent by India and hang it in your classroom.

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Chapter 13

Information Technology

Study Points:

13.1 Introduction to information technology
13.2 Major modes of communication
13.3 Artificial satellite and communication
13.4 Computer
13.5 Internet
13.6 Cyber security.

13.1 Introduction to information technology

Next century will be without words and books, it will be century of internal intrigue of eyes, ears and mind, when a person will not read himself by his mind but through the screen. Thinker Sarasota might have told these words full of imagination on the basis of changes taking place in the century.

How do we get information about the events occur around city, state, country and

Fig 13.1 knowledge of words in your hand

Let us know it also-

Do you know about the mode of communication hundreds of year ago? How many challenges were faced in sending message. Communicated through the bugle or Dhol. To send the secret messages, the pigeons, horse - riders were used by many Maharajas. In middle Europe, the messages were sent by torch telegraph about past hundreds years. In 1837 our country started postal system to send the message. After telegraph, the teleprinter and telex came into use to propagate the information. Due to more and more use of computer and internet, the use of old communication means are being limited and replaced by modern means of communication.

Fig 13.2 Teleprinter

abroad. What are the means to know about the events? Do we get quick information about the events which happen in remote areas or does it take more time. Hundreds of years ago were we getting information as easier as today?

Let us try to find out answers of these question.

Extension of information about the events, that occur at different places in the world is information extension. The information extension or in other words speedy information is due to science, technology and inventions of different public media is known as "information technology".

What is Information Technology?

"Branch of technology in which information is sent or received through telecommunication medium by using computer is called information technology.

Can you tell the name of means of communication under information technology? Let us prepare a list of these means.

Table 13.1

Sr. No.	Modes of communication	Uses
1.	Radio	
2.	Telephone	
3.		To send information, graph, chart, hand written or typed documents through telephone net work and receive photo copy of original documents from other place
4.		To prepare document in word processor and sending on computer screen for another person through telephone network
5.	Television	

Above modes of communication are widely used in information technology these days. It is not hyperbole to say that we cannot imagine a human life without these modes of communication.

Do you know the different modes of communication under information technology?

Let us, find out-

Messages from different modes of communication like - television, fax, telephone etc. are sent from one place to another by means of communication satellites.

13.2 Major modes of communication

Radio

Radio is the powerful and effective means of communication. This is a mode of communication in which messages are sent from one place to another by invisible electromagnetic waves. This is a major mode of entertainment, live commentary of games, news, music, programs etc. police vehicles, fire brigade, aero plane pilot, astronauts, ship commander remain in contact with geo - centers through radio. Radio broad casting was started in 1927 A.D. in India. It was named as "All India Radio" in 1937 later on in 1957 it was named as "Akashvani". Radio waves are like light waves the difference in only of frequency. The meaning of frequency is number of vibrations per second. It is measured in hertz. For radio transmission radio waves are divided in three types - medium wave, short wave and ultra - short wave.

Telephone

Telephone is a word of Greek language. Tele means 'far' and phone means 'sound' means to send sound at far place. Graham bell discovered it first of all. In our country telephone started in 1982 with establishment of telephone exchange at Kolkata, Mumbai and Chennai. With time working process of telephone developed. At the time of independence there were 8200 telephone connection in India, later on in 2015 this number reached to 970 million.

In 1960 electronic exchange established. Therefore, first time subscriber trunk dialing (STD) services started between Luckhnow and Kanpur in 1960.
The part of telephone which we keep in front of mouth is known as mouthpiece and the part which we keep near ear is called ear piece, mouthpiece works as transmitter and earpiece works as receiver.

Can you tell which type of telephones we are using in modern era? Let us try to know about it-

Modern telephone improved a lot. Many people can talk at the same time with new type of electronic phone. With the help of this type telephone a meeting can be arranged without leaving home or office. This system is known as Audio conferencing. Newly developed telephones which are in use mainly these days are as follows.

1) Photo phone 2) Cordless phone 3) Cellular phone

Satellite phones are those which look like normal mobile phone (smart phone). These phones can be connected to geo-satellites which are revolving in geo-stationary orbit. We can not do this by simple mobile phones. Satellite phone can be utilized in those remote areas where there is no net work coverage of any network service provider. These phones are used in remote areas for different expeditions or for natural disaster when all other modes of communication fail.

The mobile phones which we are using presently are of cellular type based on four techniques GSM, CDMA, D-AMP3S and PDCS.

Do you know the means of communication hundreds of year ago? What problems people were facing in sending their message and how much time it take?

Let us try to find out.

Fax

Fax is an important achievement of information technology. It can send graph, chart, hand written or printed documents through telephone net work from one place to another. We obtain a photo copy of original document at receiving end.

Fig 13.3 Fax Machine

The word fax is originated from English word "fascimile". The fascimile word is a Latin word in which 'fas' means 'to make' and 'cimile' means 'similar to'.

Fax system was invented in 1843 by Scottish Alexander Bell.

Operating uses of Fax machine are increasing day by day. Some services which use fax are as follows.

1) In the field of advertisement, exchange of graphics between agencies & consumer.
2) Share market and scientific services.
3) Transmission of messages and directions of administrative services.
4) Administrative engineering data.
5) Transmission of different types of documents in energy industry

Television

Television is a mode of communication in which we receive both audio and video image. With the help of this we receive direct telecast of events occurring in the world. On 26 January 1926, John.L.Bair successfully introduced television transmission. In India service of T.V. was started on 15 September 1959 in Delhi.

There are two types of television colored and black & white. Audio and video signals are converted into electromagnetic waves for transmission from program transmission center. These waves spread all around the antenna and reaches to our television antenna. Television antenna is connected to television and it converts electromagnetic waves again into audio video signals.

Tuner circuit, amplifier, detector circuit, power supply, picture tube and loud speaker etc. are elements of television set. In general picture tube is known as screen. There are two lakh points of light sensitive substance on the

screen. Colored Televisions have three electron tubes. Inside these electron tubes there are mirrors, which divide light, obtained through camera, into three parts. T.V. can be controlled manually or by remote control device. Remote control is a small rectangular box having buttons. By pressing these buttons infrared ray are emitted which are received by television.

Many advanced television like, flat T.V., L.C.D. T.V.(liquid crystal display T.V.), LED T.V. (Light Emitting Diode T.V.), Curved T.V. are in use these days. In advanced technique of transmission cable T.V. and D.T.H. (Direct to home) services are more prevalent. In DTH system a small dish antenna is used, no cable operator is required. Dish of antenna directly received signals from satellite. DTH transmission uses high technique to get multichannel programs. The size of dish antenna is 50 to 75 cm in diameter.

Fig 13.4 DTH Transmission Service

Electronic mail or E-mail

As we send letter by post from one place to another, in the same way, now we can send letter by computer. This system is called as electronic mail or E- mail. The matter of the letter which is to be sent is prepared in word processor. After that this letter is sent via telephone network to destine. The whole matter of letter is displayed on computer or mobile screen of receiver. The receiver can get the print out of the document.


Fig 13.5 E-mail

Electronic mail is very fast system. It saves time and paper both and it is cheaper also. The research and development work on E-mail in India is continuously going on at C-DOT telecommunication department in Delhi, five centers of Indian Institute of technology and Indian Institute of science (Banglore) etc.

13.3 Artificial Satellite and Communication

You have studied in previous article about how we hear and see the events happening in remote areas by the mode of television. The faxed letter can be received at for places with the help of artificial satellite, by telephone we talk to a person situated at remote place.

13.4 Computer

Computer is a machine, which can send thousands of word from our place to another in a second. Just by speaking it is impossible to send message with such a high speed. Any message converted into computer language can be transmitted in the form of micro pulses.

Integrated service Digital Network (ISDN) is an ultra modern technique in the field of telecommunication which is possible due to computer. This technique transmits voice, written material, data and figures on a single wire. Among four any two can be transmit simultaneously by ISDN.

13.5 Internet

Internet is an international information path. It is formed by computer networks established at different places of world. These computer networks are connected by telephone lines. Through this path information reaches instantly from one place to another.

Word 'Internet' is combination of two English words 'International' and 'Net work', which means - worldwide system. It is a wireless system.

Major Services Based On Internet

E-Commerce

E-commerce converted entire world in a market (Mandi) where you can purchase small to big items. Only by opening the website related to E-commerce and by giving your order you can receive your favorite items.

Credit card is the easiest made for shopping on internet. Sell or purchase of products and services providing information of products to customer through advertisement on internet is known as E-commerce.

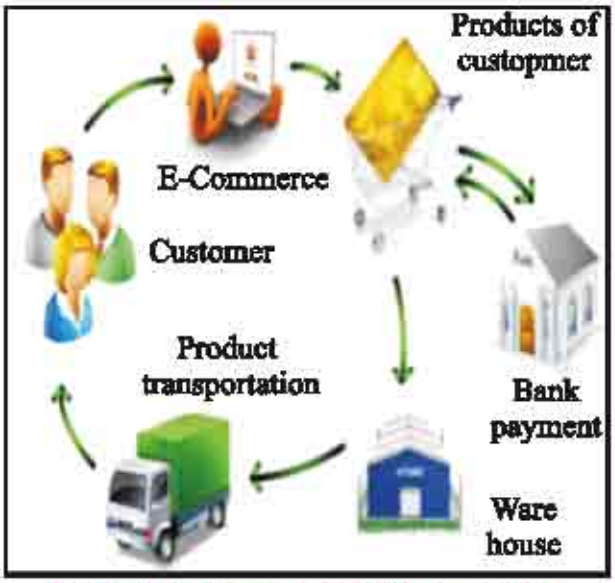

Fig 13.6 Business through information technology

For completion of commercial activities, E-commerce plays an important role. It includes many useful techniques like computer net work, internet, worldwide web, electronic data interchange (EDT), e-mail electronic file transfer etc.

Telemedicine

Telemedicine is basically a health service providing system. In this system doctor examine and give treatment to a patient far away, using telecommunication and information technology. In this system doctor and patient can see and talk to each other also the pictures of ECG, X-Ray, CAT-SCAN, M.R.I. etc. can be examined by opening the computer video file.

Fig 13.7 Telemedicine service

Broad band

A modern technique of transmission of information in which many channels can be transmitted simultaneously through a single cable or wire called as Broad band.

Fig 13.8 Broad Band Service

Social Media

Writing blog, business network, enterprise social network, forum, micro blog, photo sharing, product and service review, social bookmarking, social gaming, social network, video sharing and virtual world etc. are different modes of social media.

Face book, twitter, blogger, pinto rest, tumblers etc. are famous social media sites. People share their ideas and matter with each other on social media.

Whatsapp, Hike etc. are mobile social media applications.

E-mitra

E-mitra service is Rajasthan government's ambitions E-Governance facility. It is available in all the 33 districts on public private partnership model for people facility with transparency. Many government and private service related works are being conduct under one roof by e-plate form. These services are available on line in rural areas by common service centre (CSC) Kiosk and in urban area by e-mitra Kiosk. This project is running since 2005. People with this service can pay electric, water and telephone bills also they can get bonafied certificate, ration card, swarn jayanti gram swarojgar yojna loan facility, learner driving license, bus pass of Rajasthan road ways etc. with ease.

Information Technology and comfort society

Extreme capabilities of information technology and internet produce a new hope to hypothesis of corruption free society. To remove corruption form the society the information technology can be use as follows

- By computerization of public distribution system and make availalbe the information related to supply distribution on web for public.
- By doing computerization and net working of public dealing offices.
- The other reasons of corruption - deficient in transparency in work culture, the government has agreed to give/share the information to the common man under fundamental right of freedom. To implement this rapid exchange of information through computerization of information system, intranet, internet and extranet can be done.
- Our government is planning to deliver clean and transparent system to control tendency of corruption by the optimize use of information technology.
- In banking system, introduction of information technology created a reform in customer service. It also controls financial scams and corruption in effective way.
- With the help of this technology public dealing offices like, income tax, central excise, border tax, water, electricity, municipal system, driving license, ration etc. can be converted into paperless offices. It is also useful in making these offices clean, transparent and of low cost.

13.6 Cyber security

Cyber security is also called "security of information technology". It stops unauthorized access into various computers, important networks and confidential programs and data.

The Government, military, corporate sectors, financial institutes, hospitals, and other important institutes are collecting confidential information and processing and sending to another computer. It becomes almost necessity to ensure the security of important information and confidential data for public and national security. That is why there is need in cyber era to secure the cyber security.

This cyber security is carried out by securing these activities using different software and technology.

What have you learnt

- Information technology is a branch of engineering in which information are collected and transmitted through the mean of telecommunication using computers.
- Hundreds of year ago the various means of communication were – pigeon, horse riders, Dhole, Bugle etc.
- Radio is a very powerful and effective means of communication which send the messages from one place to another place by invisible electromagnetic waves.

- Satellite phones are very useful in establishing the contacts in remote areas through satellites which revolve in geo-stationery orbits of earth.
- Television is a important and powerful means of communication and entertainment in which we receive audio and video both.
- Computer is an important device by which many communication means operated. It can send thousands of words from one place to another place in a second.
- Internet is an international information path which is formed by joining different telephone networks at different location of world.
- A person can create and share the information with others by the use of social media technique. Information may be regarded with carrier related, hobbies, images, video etc.
- E-commerce, E-mitra, telemedicine, broadband, etc internet based services have made human life simple and easy.
- Telecommunication and information technology have made the life fast, easy and simple but cyber is crime has spread its legs in human life. So, utmost need to adopt the cyber security means.

Exercises

Choose the correct answer.

1. In which year the radio broadcasting had started in India?
   (A) In 1926 A.D. (B) In 1927 A.D.
   (C) In 1928 A.D. (D) In 1925 A.D. ( )
2. At which place our countries first telephone exchange was established?
   (A) In Delhi (B) In Mumbai
   (C) In Pune (D) In Bangalore ( )

3. The part of telephone instrument which is placed in front of mouth and collect sound and propagates the information in the form of electromagnetic waves is called -

(A) Mouth piece (B) Receiver

(C) Cable wire (D) None of the above ( )

Fill in the blanks with suitable words.

1. The device based on information technology which send the graphs, charts, etc. through telephone network from one location to another location is called .....
2. ..... is system which provides mainly health services. The doctors diagnose and cure the disease of patient at for places through use of telecommunication and information technology.
3. Telephone is word of "Greek" language in which 'tele' means far and 'phone' means.....
4. The multichannel T.V. programs can be seen directly at home through satellite by using dish antenna without any cable operator. It is possible only due to .....

Short answer type questions

1. Define the information technology.
2. Tell any three names of telecommunication medium of information technology based on internet.

Long answer type questions:

1. What do you mean by word television. Explain the working system of television. Write the names of latest technology and advanced quality television of present era.
2. What is internet? Write the main names of communication means based on internet and describe any two in detail.
3. Describe the utility of information technology. Make a list of possible cyber crimes by taking into consideration of human future and tell its safety measures.

Activity work:

1. Search and prepare a list of websites related to educational sector.
2. Make a list of educational programs which are broadcasting through radio or television. Arrange a program to discuss utility of these programs.
3. Observe E-mitra centre and write note on it.

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Chapter
14

Refraction of Light

Study Points:

14.1 Refraction of light
14.2 Phenomena based on refraction
14.3 Lens
14.4 Use of Lens and Optical instruments
14.5 Human eye
14.6 Colour dispersion of light

You know that light seems to move in straight-line in transparent medium. When it strikes on opaque object during propagation in straight-line in transparent medium then it does not move forward and a shadow of object appears behind the object. Similarly, when light strikes on bright opaque object (mirror) during propagation in straight-line in transparent medium then it returns to same medium. But, what happen, when light enters from one transparent medium to another transparent medium? Does it also move in straight-line or changes its direction? You might have seen in daily life experiences that the bottom of water filled container or pond or well seems to raised. Similarly, when a thick glass slab is kept on alphabet of any book or newspaper then the word seems to be raised. Why this happen? Let us know about it.

14.1 Refraction of light

Activity -1

Take a white paper sheet and fix it on drawing board with drawing pins. Put a rectangular glass slab at the middle of sheet. Draw the perimeter of rectangular glass slab with pencil. Mark PQRS on it and remove the slab. Now, draw a normal MON at point 'O' and draw a line AB making an angle i (30o) with the normal with the help of protector. Insert two pins vertically at point 'A' and 'B' as shown in fig. 14.1.

Now, put again the glass slab on same perimeter PQRS and see from the opposite face of glass slab the images of pins 'A' and 'B'. Now put another pin 'C' with viewing the pin 'A" and 'B' in such a way that image of 'C' is also form on straight-line on which images of pins 'A' and 'B' formed. Put one more pin 'D' in

similar fashion so that pin 'D' and 'C' , and pins 'A' and 'B' are on same straight-line. Remove all the pins and glass slab. Denote a mark on the positions of pin 'D' and 'C' and draw a line CD and extend it to a point O'. Draw the normal O'N' at point O' on surface SR.

Now, join the point O and O' and extend the line AB also as shown in fig with dotted line.

You see that light moves along the line AB in air and enters into glass slab after striking on glass surface. At point O , the light ray AB in air (rarer medium) bends towards the normal during entrance in glass (denser medium).

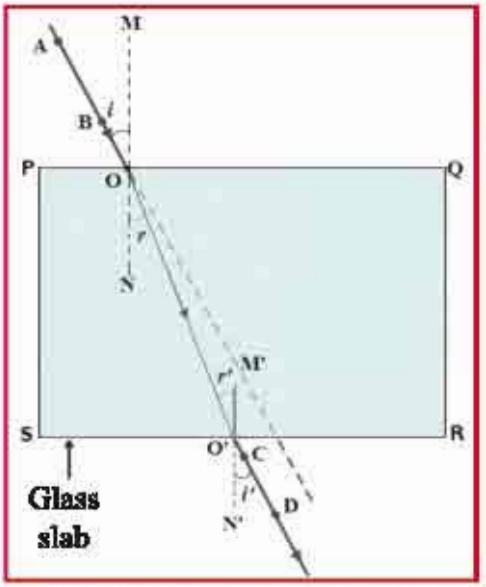


Fig. 14.1 Refraction from glass slab

Similarly, at point O' on surface SR, the light ray from glass (denser medium) comes out in air (rarer medium) then it bends away from the normal.

So we can say that -

1. When a light ray enters in denser medium from rarer medium then it bends towards the normal.
2. When a light ray enters in rarer medium from denser medium then it bends away from the normal. i.e.

> "When a light ray passes from one medium to another medium then it deviates from its original path. This phenomenon is called refraction of light."

Why refraction occurs:

The speed of light is less in denser medium compared to rarer medium. So, it is clear that when light enters into denser medium from rarer medium then its speed reduces. When light enters into rarer medium from denser medium its speed increases. The refraction occurs due to change in speed of when it passes from one medium to another.

Coefficient of Refraction (Refractive Index) : Coefficient of Refraction is the ratio of speed of light in two mediums. It is a constant and dimension less quantity.

$$\text{Refraction coefficient } (\mu) = \frac{\text{Speed of light in first medium}}{\text{Speed of light in second medium}}$$

$$\mu = \frac{v_1}{v_2}$$

In daily life we observe many phenomenon and effects due to refraction. Here we will discuss few of them by different activities.

14.2 Phenomenon based on refraction

1. Bottom of the bucket filled with water seems higher

Activity-2

Put a coin at the bottom of bucket filled with water. Try to lift the coin in a single attempt by keeping your eye just above water. Are you succeeding to lift the coin in single attempt? Repeat the process again. Why are you not successful in lifting the coin in single attempt? Ask your friends to do similar activity. Compare your experience with your friend's experience.

Activity-3

Put a coin at bottom of a pot of glass or plastic or stainless steel. Keeping eyes on the coin move away slowly from pot till coin disappears. Now, ask your friends to pour water carefully and slowly into pot (as fig. 14.2 (a)), ensure that the coin should not displace from its position. Are you able to see the coin again, now? You did not change your position, then, how it becomes possible to see the coin?

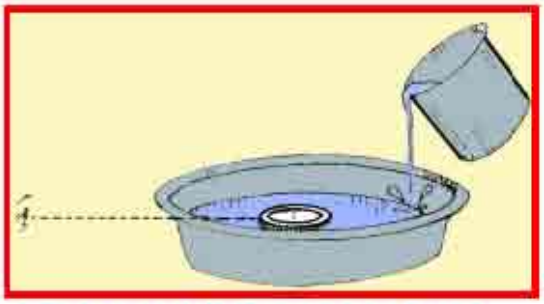


Fig.14. 2 (a) Coin in tub filled with water

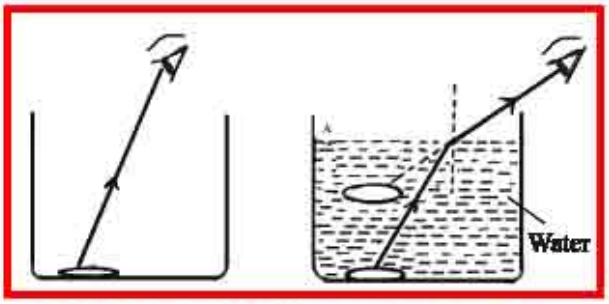


Fig.14. 2 (b) Coin seems lifted in glass beaker.

It is due to refraction of light. According to fig. 14.2 (b) when light rays from coin passes from water (denser medium) to air (rarer medium) then it bends away from the normal to the surface. When these refracted rays enter in our eyes, the coin appears raised.

Similarly, the bottom of container, pond, well, swimming pool filled with water seems raised.

Do it also.

Put a white paper on table. Draw a thick line on the white paper. Put a glass slab on the thick line in such a way that its one end makes any angle with the line. Now, see from the side the portion of line which is under the glass road. What do you see? Is the line near the edge beneath the glass slab seems to be bend? Put the glass slab perpendicular to line. Now what do you see. Is the portion of line beneath the rod seems to be bend?

2. Twinkling of stars

The layers of atmosphere have different densities. So have different coefficients of refraction. The light coming from stars deviates continuously after passing through these different atmospheric layers. That is why, the stars seem twinkling.

3. Bending of pencil in water

Activity-4

Take a glass. Fill it with water and put a pencil in such a way that it is partly immersed and held obliquely to the surface. It appears to be bent at the point (at the upper surface of water level) where it enters water. It is due to refraction of light. The light ray coming from the immersed portion of pencil bends and moves away from the normal to the water surface. That is why the pencil partly immersed in water appears to be bent at the water surface.

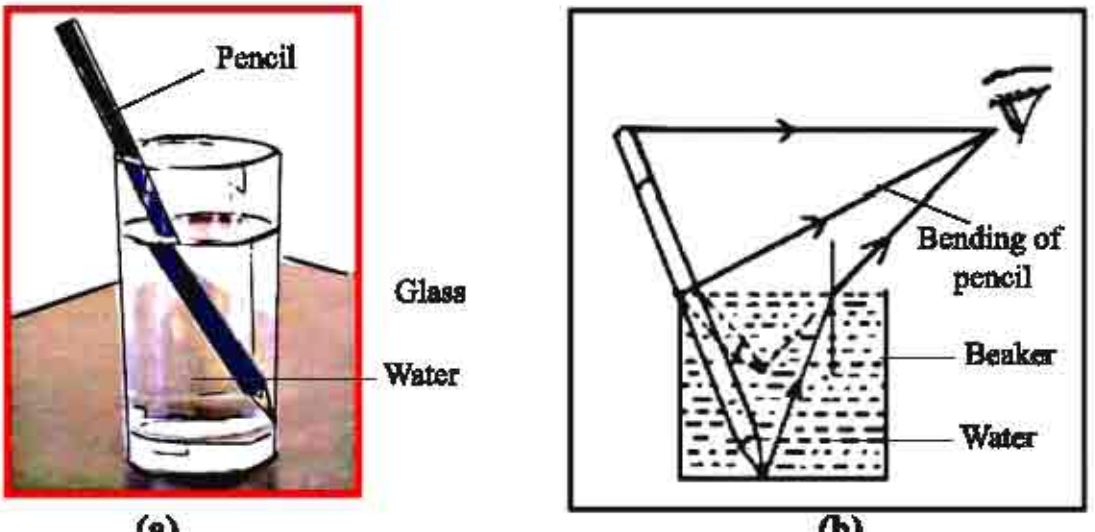


Fig. 14. 3 Pencil immersed into water seems bend.

4. Appearance of sun before sunrise and after sunset

At the time of sunrise in morning, the light ray coming from sun gets refracted (bends) by different layers of atmosphere and reaches to our eyes. Because of this atmospheric refraction, the sun appears to be raised above the horizon. There for the sun can be seen two minutes before actual sunrise.

Similarly at the time of sunset sun can be seen two minutes after the actual sunset. Thus the day time increases by four minute.

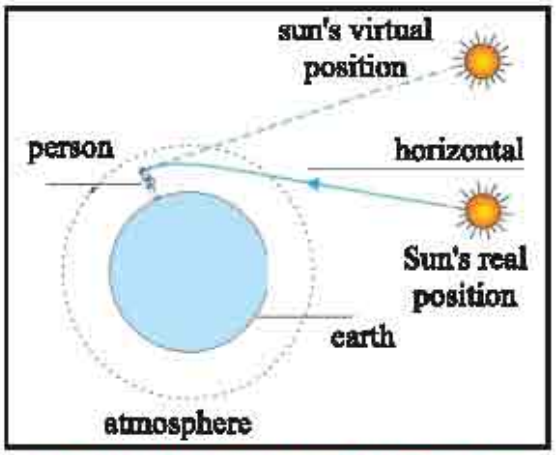


Fig.14. 4 Sun is seen before sun rising and after sun set.

14.3 Lens

You have seen many people wearing eye-glass and also few students do not able to see clearly words written on black board. These children are advised to wear spectacles. Did you thought ever? What is the different in spectacles, so visibility become clear? Spectacles have lenses.

" The transparent medium covered by the two curved surfaces is called lens.."

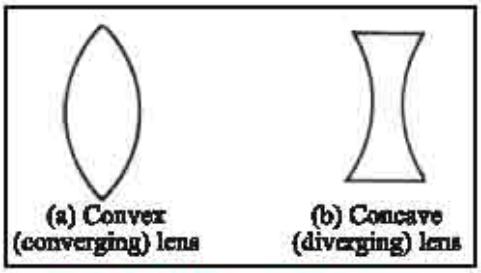


Fig. 14.5 Type of lenses.

Types of lens:

Mainly there are two types of lens-

1. Convex (converging) lens
2. Concave (diverging) lens

1. Convex (converging) lens

Activity-5

Take a convex and a concave lens and see its shape by touching.

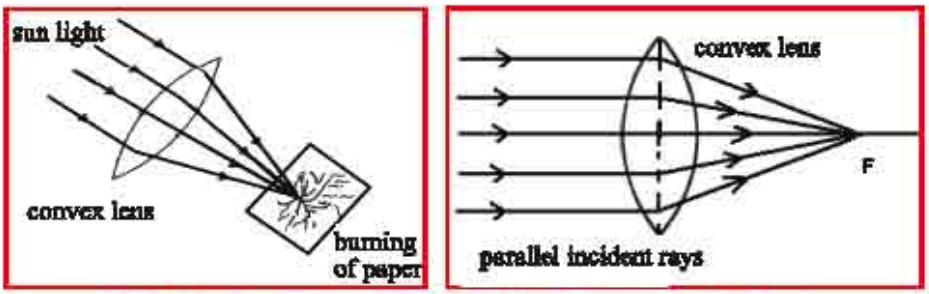


Fig. 14. 6 Conversing nature of convex lens.

The lens which is thinner at the edges and thick in the middle portion is called **Convex lens.**

Take a Convex lens and a paper. Pass the sun light rays through the convex lens in such a way that it gathered at a single point on the paper. Now hold this position till, paper does not start to burn.

The parallel rays passing through Convex lens converge (meets) at a single point. That is why it is called **Converging lens.**

The incident rays parallel to principal axis gets focused at a point on principal axis after refraction from Convex lens. The point is called (F) the focal point of convex lens.

Precautions:

To see the sun or any bright light through the convex lens is dangerous. It may damage your eyes. You should not focus the sun light on any part of body. It can burn your skin.

2. Concave (diverging) lens

The lens which has thicker edges and thiner in the middle portion is called concave lens. It spreads the incident parallel rays (diverge it). That is why this type of lens is called diverging lens.

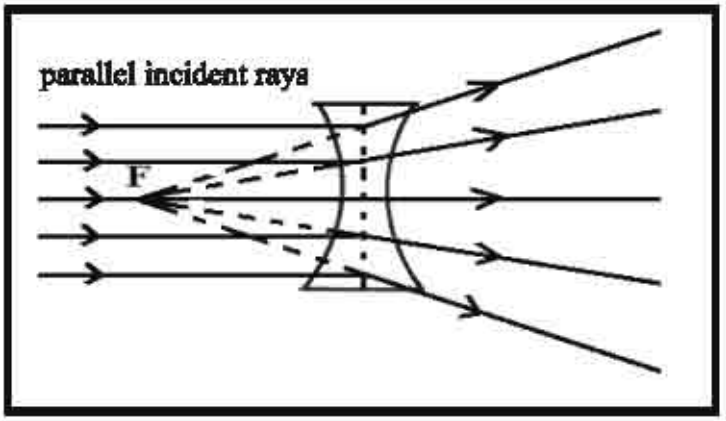


Fig. 14. 7 Diverging nature of concave lens.

The light rays passing through lens deviates from their path. So, we can say that the lens refract the light rays.

Some definitions related to lens:

Principle axis: The line passing through the centres of curvature (C1 and C2) is called principle axis.

Optical centre: The point on the

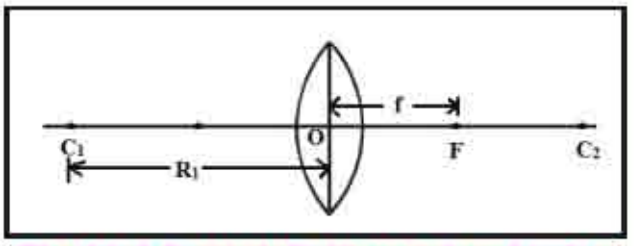


Fig. 14. 8 Some definitions related to lens

principal axis inside lens, through which a light ray passes without any deviation, is called optical centre (O) of the lens.

Focal point:

1. Incident light rays parallel to the principal axis converge at a point on principal axis after refraction from the convex lens. This point is called Focal point (F) of convex lens.
2. Incident light rays parallel to the principal axis appear to diverge from a point on principal axis after passing through the concave lens. This point is called focal point (F) of concave lens.

Focal length: The distance between the focal point and optical centre of lens is called focal length (f).

Formation of image by convex lens:

Activity - 6

Take a convex or magnifying lens and a paper. Pass the sun light through convex lens and focus it at a point on a paper sheet. Hold the lens till paper does not start to burn. You see that convex lens converge the incident parallel sun rays at a point. The point is called the focal point of lens. We can find the approximate focal length by measuring the distance of the image from the optical centre of lens. This point is the infinitesimal small image of sun. The image can be obtained on screen. Thus it is a real image. The real images are always inverted. Thus we can say that -

"When the object is at infinity then image formed by the convex lens is real, invert and infinitesimal small at focal point."

Activity - 7

Draw a line on table by the chock and mark a point at the mid of it. Put the convex lens on this point in such a way that the optical point O of lens lies on it. Mark a point F' on left side of optical point O at a distance equal to focal length (f) and mark another point 2F' at the distance equal to f from the point F' (fig. 14.9 (a)).

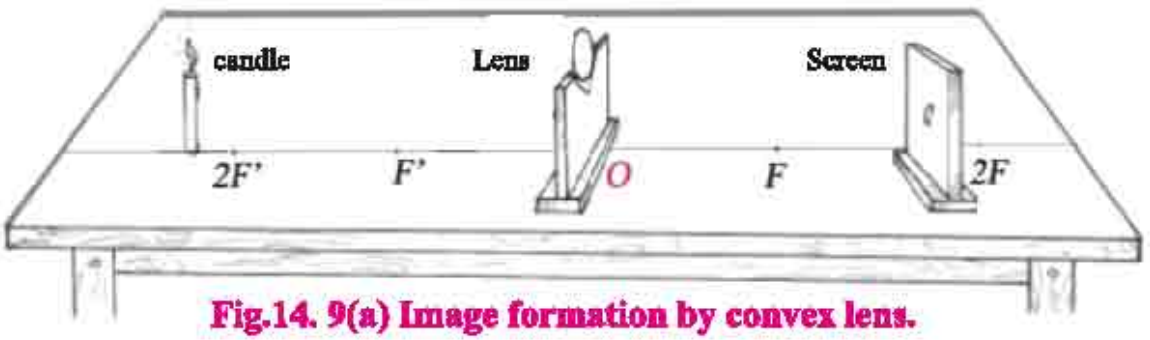


Fig.14. 9(a) Image formation by convex lens.

Similarly, denote two points F' and 2F' on right side of lens. Now put a burning candle little away from 2F' towards left side. Paste a white paper on the 15 cm long and 10 cm wide cardboard. It will work as screen. Put it on right side of lens and adjust the position to get sharp and bright image of candle's flam. See the image carefully. It is inverted and small. It can be obtained on screen. It is real and positioned between F and 2F.

Repeat the same experiment for different positions of candle. Write the observations and compare it with the data given in next table.

Activity-8

When the object is between lens and F, you will not be able to get the image. To find the position of image, remove the lens from the stand and put near the printed alphabets of a book and see its virtual and erect image in lens. Do you see the enlarged alphabets? In this situation, object is (alphabets) between optical centre O and focal point F of the lens. You will see virtual, erect and enlarged image (Fig. 14.9(B)).

Fig. 14.9(b) Big, erect and virtual image formation through convex lens.

Table 14.1 Image formation by convex lens

Sr. No.	Object's Position	Position of Image	Size of image	Nature of image
1	At infinity	At F	Infinitesimal small and inverted	real
2	At some distance away from 2F'	Between F' and 2F	Small and inverted	real
3	At 2F'	At 2F	Equal and inverted	real
4	Between F' and 2F'	away from 2F'	large and inverted	real
5	At F'	At infinity	Very large and inverted	real
6	Between Lens and F'	Between infinity and lens	large and erect	virtual

Image formation by concave lens

Now, put concave lens in place of convex lens and repeat the activity. You will find that the image is not formed on screen by the concave lens. Its image is always erect, virtual and small which can be seen by putting eyes in front of concave lens.

Fig. 14. 10 small, erect and virtual image formation by concave lens.

14.4 Uses of Lens and Optical instruments

1. In correction of defects of vision

Both types of lenses are used in spectacles. Those who cannot see clearly the distant objects have nearsightedness eye defect. Such people use the concave lens spectacles. Those who cannot see clearly the near objects are suffering with farsightedness of eye defect. Such people use the convex lens spectacles.

2. Simple microscope

In previous activity, we have seen that the convex lens is used as magnifying lens. (fig. 14.9 (b)) to see enlarged letters. In this way it is used to read very small letters. Clock repairer uses the convex lens to see small elements of clock. This single lens device is called simple microscope. The low focal length lens is used in simple microscope. With the help of microscope we can see small objects in enlarged form.

3. Compound microscope

Observe the compound microscope available in your school. This consists of two convex lenses inserted into a metal tube. The lens towards object is called objective lens. The lens towards our eye through which we see is called the eye-piece or eye lens.

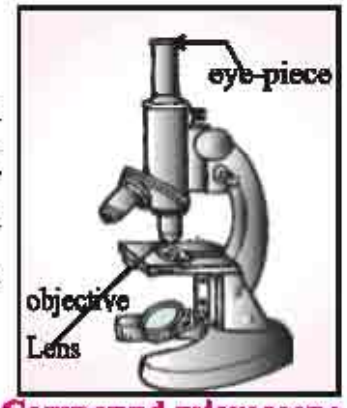


Fig. 14. 11 Compound microscope.

let us do it also

Prepare a slide of onion with help of your teacher. Now see it through simple microscope and compound microscope one-by-one. What difference you observe in size? You will find that the compound microscope enlarge the object many times, in comparison to simple microscope.

4. Telescope

The telescope is used to see the distant objects. It has also two convex lens one is called objective lens and another is called eye-piece.

14.5 Human eye

In our eye there is flexible convex lens made up of muscular tissues. The image of object is formed at retina and we see the objects.

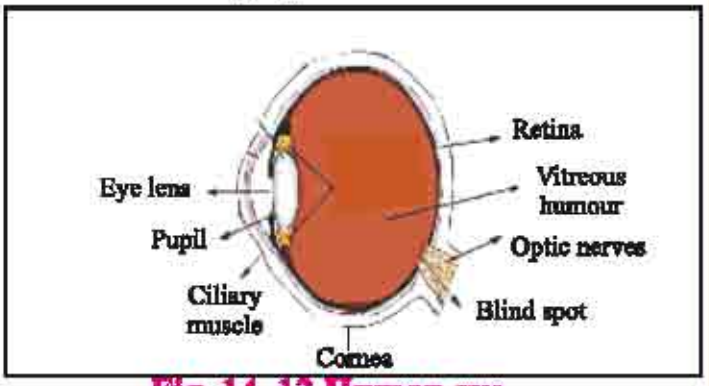


Fig. 14. 12 Human eye.

The shape of eye is spherical. Outer coat of eye is white. Its front transparent part is called cornea. Behind the cornea, there is dark muscular structure is called Iris. Small hole in Iris is called pupil. The size of pupil is controlled by iris and iris also controls an amount of light entering into eye. In the case of more light the aperture of pupil reduces and in low light the aperture of pupil increases. Eye lens is situated behind the pupil. The position of lens is held by muscular tissues. A space between cornea and eye lens is filled with transparent liquid material which is called eye fluid.

The inverted image is formed on retina. Retina is light sensitive transparent membrane which contains lot of light sensitive neurons. It is connected to brain. When these neurons send the signals generated by formation of image on retina to brain. Then brain converts images into erect and we see the object.

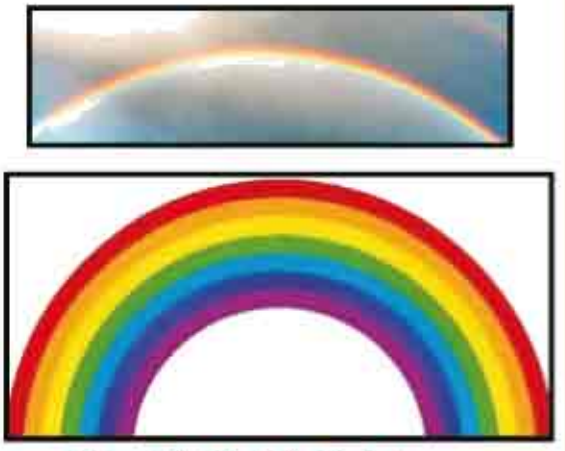


Fig. 14. 13 (a) Rainbow.

The liquid filled between the retina and lens is called vitreous humour.

14.6 Dispersion of light

In rainy season you might have seen the seven colour arc shape strips in sky when the sun is at your back. The group of these seven colours strips is called rainbow.

Have you ever think about it. Why does it happen?

Let us learn by doing.

Take a prism and put one face in front of sun light. Rotate the prism slowly in such way that the refracted light rays fall on a wall under shadow. Observe the refracted light on wall. What do you see? We see a group of seven colours strips on the wall. This is called as "Spectrum of light".

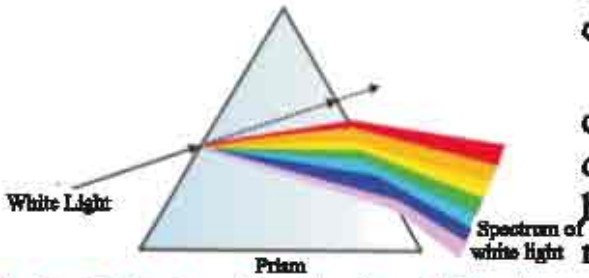


Fig. 14. 13 (b) colour dispersion through the prism.

The sun light is made up of seven colours due to which it is seen white. In denser medium, the different colours have different speed. The red colour has more speed. So, it deviates less when it passes through prism. The violet colour has less speed, so it deviates more after passing through the prism.

When white light passes through a prism it splits into seven colours- red, orange, yellow, green, blue, indigo and violet. This is called **Dispersion of light.**

When sun light passes through rain drops refraction and total internal reflection takes places and rainbow is formed.

Dr. C.V. Raman (Dr. Chandrasekhara Venkata Raman)

He was an Indian physicist. He was honored with prestigious Nobel prize in Physics in 1930 for his excellent work on scattering of light. The discovery made by him on scattering of light is known as Raman effect. He was awarded the 'Bharat Ratna' by the government of India in 1954 A.D. and also awarded Lenin Peace Prize in 1957 A.D. Chandrasekhara Venkata Raman had discovered the 'Raman effect' on 28 february, 1926.

In memory of Raman, "National science day" is celebrated each year in India.


Fig 14.14 Dr. C.V. Raman

What have you learnt

- When a light ray enters from one medium to another medium, it deviates from its path. This phenomenon is called refraction of light.
- When a light ray enters into rarer medium from denser medium then it bent away from the normal and when a light ray enters into denser medium from rarer medium then it bent towards the normal.
- The ratio of speed of light in given two medium is known as refractive index. It is a constant and dimensionless quantity.
- Lenses are made up of transparent materials which have two curved surfaces.
- Lenses are of two types - Convex lens and concave lens. Convex lens has thinner edges and thicker at the middle whereas concave lens has thicker edge and thin at the middle.
- Lenses are used in spectacles, simple microscope, compound microscope, telescope, cameras, etc.
- To remove the farsighted defects we use spectacles of convex lens whereas to remove nearsighted defect we use spectacles of concave lens.
- We have a convex lens in our eye. It forms the inverted image of an object in front of our eye and our brain converts it into erect image.
- The phenomenon of splitting of white light into its component colour is called the colour dispersion.

Exercises

Choose the correct answer.

1. Which of the following event is not related to refraction of light?

   (A) The bottom of water filled bowl appears raised.

   (B) Appearance of sun before sun rising and after sunset.

   (C) Formation of image by mirror.

   (D) Twinkling of starts ( )

2. Which is not a part of human eye?-
   (A) Retina (B) Cornea
   (C) Pupil (D) mid plane ( )
3. When a ray of light enters into rarer medium from denser medium. Then it bends -
   (A) Away from normal
   (B) Towards to normal
   (C) Move in straight-line without deviation
   (D) Non of the above ( )

Fill in the blanks with suitable words.

1. .....of eye control the amount of light enter into eye.
2. The image formation by the .....lens is awlways erect, virtual and small.
3. Light ray enters into water medium from air bends .....the normal.

Match column A and B:

	Column 'A'	Column 'B'
1.	Liquid filled in between lens and cornea.	A. vitreous humour
2.	transparent liquid filled in between lens and retina	B. Iris
3.	muscular structure of dark colour behind the cornea	C. Retina
4.	The portion of eye on which image is formed.	A. Eye fluid

Short answer questions

1. What is refraction? What is the cause of refraction?
2. Write the main difference between convex and concave lens.
3. Define the refraction coefficient?
4. What do you mean by dispersion? Write the sequence of colours in rainbow.
5. The two classmates of Meena are Raghav and Megha. Raghav is not able to see distant objects and Megha is not able to see near objects. What are eye's defects they have? To remove these defects which type of lens they should use in their spectacles?

Long answer questions:

1. Explain the refraction of light rays from glass slabe with a pictorial diagram.
2. Name the optical instruments which use lens. Describe it in brief.
3. Explain in brief the working and structure of human eye.

Chapter 15

Natural Phenomena

Study points

15.1 Air exerts pressure
15.2 Effect of air velocity on air pressure
15.3 Non – uniform heating of earth
15.5 Thunderstorm
15.6 Cyclone
15.7 Tornado

You must have seen dry leaves, dust particles, send etc. Flying away with strong wind. You must also have heard the sound of collision of windows of doors. Sometimes it starts raining, thunder and lightening along with fast flow of air. What are the reasons behind the natural phonemend? In this lesson we will discuss these phenomena with the help of various activities.

15.1 Air exerts pressure

Activity 1

Take a plastic bottle. Fill it half with hot water. After some time vacate the bottle and immediately close the lid tightly. Now pour cold water over the bottle and observe it. Bottle gets squeezed. Why it happens?

Fig 15.1 Cool the bottle by pouring water

Some water vapors in the bottle gets cool down and convert into water. Thus the air pressure inside the bottle becomes less compare to outside the bottle. This difference in pressure causes bottle to squeeze.

What happens when we fill up excess air in the balloon? Why balloon burst? What does air do inside the balloon? Kite fly only when air blows, why? How is air helpful in flattening of flag, blowing of dust and leaves etc.

Flying kite, bursting of balloon, fluttering of flag, blowing of dust and leaves etc happens due to air pressure. All these activities prove that air exerts pressure.

Let us do some other activities related to air.

15.2 Effect of velocity of air on air pressure -

Activity 2

Take a empty bottle, Make a small ball by folding a piece of a paper and keep it inside the bottle near the mouth. Try to insert the ball inside the bottle by blowing through the month of bottle. Repeat the process with bottles of different size of mouth.

Fig 15.2 Blowing air in bottle

Why we face difficulty to enter the ball inside the bottle by blowing.

The velocity of air increases at mouth of the bottle by blowing, It causes low air pressure. The pressure inside the bottle is more in comparison to at mouth. Because of this air inside the bottle propels (Pushes) the ball outside.

Activity 3

Take two balloons of same size. Fill them with little amount of water. Now blow the balloon to full and tie them with string. Suspend these balloons on a wooden stick and keep a distance of 10 cm between them. Blow air between balloons. What do you see? Why both balloon come near to each other?

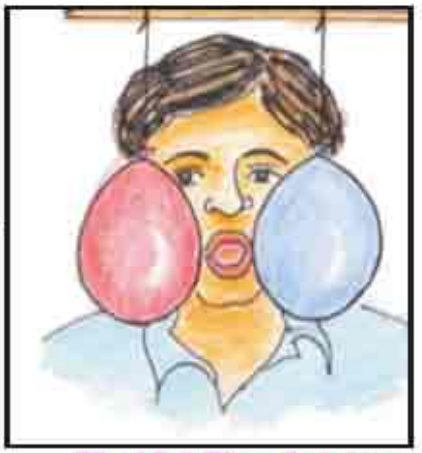


Fig 15.3 Blow between balloons

Blowing air between balloons reduces air pressure between them. Higher pressure on the other side of the balloons pushes them towards each other.

What your have learnt from above two activities?

Increase in the velocity of air, reduces the air pressure

Can you tell why air blows? Let us know about it -

15.3 Non - uniform heating of earth

Heat energy is received by earth in more on equators. Due to this, air of this area gets hot. This hot air rises up and the cold air from the poles starts to flowing to take that place. The non-uniform heating in these areas causes flow of wind.

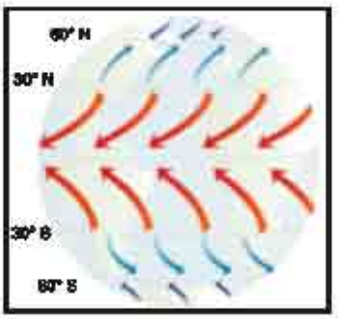


Fig 15.4 Non uniform heating of earth

15.4 Non uniform heating of land and water

In summer, the areas get heated in less time. Land remains at higher temperature compare to see water. The air above the land gets heated and rises up. This vacated area replaced by cold air from sea water and wind starts flowing. It is also called as

"moving air is calle breeze"

In winter air flows from land to see. Why it happens? Think over it.

Fig 15.5 In summer monsoon from South - west direction

Fig 15.6 In winter monsoon from north - west direction

15.5 Thunder storm

In rainy season you might have seen heavy clouds in the sky with light & thunder.

Why lightning and thundering occurs?

Let us know about it.

When temperature increases, air becomes hot and rises up rapidly. This wind also carries water vapors which present in the air. Where the temperature is less, water vapors condense into water and starts falling down. Falling drops of water and rapidly rising air interacts and produces lighting and thundering. These phenomena we call it as thunder-storm. We will read "thunder-storm" in higher classes in detail.

Safety measure of thunderstorm

1. Do not stay in open place; go inside the building at the time of thunderstorm.
2. Do not come out from your houses.
3. Don't do any water related work like Bathing, rinsing utensils, washing cloths Etc.
4. It is safer to take shelter in bus or car.
5. Do not stay under high and isolated trees.
6. Do not lay down on open lands.

Fig 15.7 Thunder storm

15.6 Cyclone

At 09.00 PM on 12 October 2013 rotating winds collide at sea coast of Odisha with the speed of 220 km per hour with heavy rain. High water waves arise

in the sea. Sea water entered in the coastal area. These strong winds and water heavily damaged houses and lakes of hectare agriculture land flooded with water, crops were destroyed, electric poles were uprooted. There were darkness everywhere, many people lost their lives. This natural phenomena in called as "CYCLONE"

Fig15.8 Tides colliding with see cost

In American continent it is called as "Hurricane" and in Japan it is called as "Typhoon".

How does cyclone form-

Water gains heat from atmosphere and converted into water vapour. When these water vapour reconvert into water droplets, heat is released in the atmosphere. Surrounding air becomes hot due to this released heat. This warm air rises upwards which lowers the air pressure. This vacated area is replaced by high velocity air flow towards it. This cycle repeats. This repetition ends with the formation of low pressure area. Around this lower pressure area different layers of air rotate with high speed. This situation of weather is called cyclone. The centre of cyclone in calm zone know as eye.

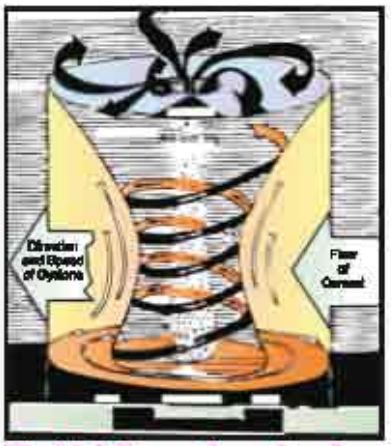


Fig 15.9 Formation of cyclone

Safety measures at government or social level.

1. Forecasts and warnings about the cyclone are issued by meteorological department.
2. Rapid communication facilities to provide information promptly and in time to the fisherman, water boats, government agencies, sea shores and public etc.
3. Rapid transportation to relocate the people in safe place.

Work to be done public -

1. We should not ignore the warnings issued by the meteorological department on radio, television, or public news papers, etc.
2. We should manage to relocate the essential house items, domestic animals, vehicles, etc into safe zone.
3. To avoid riding the vehicle on flooded road.
4. We should keep the telephone numbers of emergency services like police, fire alarming station, hospital etc

The residents of cyclone prone area should keep following precautions.

1. Store water for odd situations.
2. Do not touch the wet switches, loose and fallen electric wires.
3. Cooperate our neighbours, friends and provide help to them as much possible.

15.7 Tornado

Tornado is dark coloured and funnel type clouds and seem as coming from sky towards the earth. Tornado have wind speeds less than 180 km/h. They are weak in nature. The eastern costal part of India is more prone to cyclones. Tornadoes are rare in our country.

Fig 15.10 Tornado

What have you learnt

- Moving air is called breeze.
- When air velocity increases, Air preasure reduces.
- Non uniform heating of sky and non uniform heating of land and water are due to flow of air.
- Tornado is called hurricane in America (USA) and typhoon in Japan.
- The main reason for air currents flow is the non uniform heating at equatorial and polar regions.
- When hot air moves upwards then air pressure reduced at that place. The cold air at high pressure moves towards that place.
- Tornado is dark colored and funnel type clouds and seem as coming from sky towards the earth.

Exercises

Choose the correct answer.

1. With the increase in velocity of air, air pressure -.
   (A) Increases (B) Decreases
   (C) No change (D) Become double ( )
2. What will happen if air blows in between two balloons hanged on wooden stick separated by 10 cm distance –
   (A) Balloons come near to each other
   (B) Balloons goes away from each other
   (C) Balloons burst
   (D) No change ( )
3. Centre of cyclone in a clam area. It is called-
   (A) Centre (B) Eye
   (C) Head (D) Tail ( )

Fill in the blanks with suitable words.

1. Tornado is dark coloured and funnel type.....
2. The air flows from.....pressure area to .....pressure area.
3. Breeze produces due to .....heating of earth.
4. Air in motion is called.....

Short answer questions

1. How does cyclone formed?
2. What type of planning is needed to overcome the cyclone?
3. Describe an activity to explain air pressure.
4. What are the safety measures against the lightning thunder?

Long answer questions:

1. What are the reasons of lightning thunder?
2. Explain, what are the reasons to flow of air?

◆◆◆

Chapter
16

Air and water pollution and control

Points To Study

We all know that, these days our environment is not like as it was earlier. Our grandparents and other family members often talk about the availability of pure water and pure air some years ago. Due to the population explosion, reckless felling down of plants and forests, increasing means of transport, industrial development, increasing factories, waste materials etc., the quality of environment has continuously fallen down and water and air pollution have become a serious issue. If it is not controlled then, a time will come when clean water and air will not be available for us.

Think and answer -

- Why a traffic policemen wears mask?
- why a black smoke emerges out from the brick burn?
- Why you coughs while walking on a congested road ?
- Do You feel good in a garden, Why ?
- Has the amount of smoke in atmosphere changed ?

16.1 Air Pollution

Air is essential for life. Clean air is important for every organism. We know that air is a mixture of gases. It has about 78% nitrogen

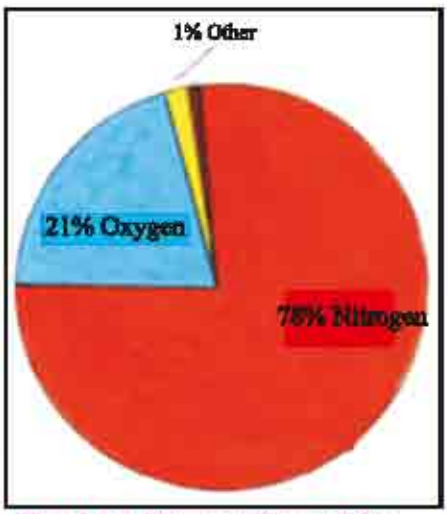


Fig. 16.1 Composition of air

and 21% Oxygen, apart from this, carbon dioxide, argon, methane other gases and water vapours are also found in small quantities. The composition of air is balanced due to mutual exchange between animals and plants in nature. But some natural causes like, volcanic erruption, forest fire and manmade causes like factories, vehicles, construction and mining etc are responsible for increasing amount of gas, dust particles and smoke atmosphere. This is causing harm effect on health of all living organisms. This is called air pollution.

The qualitative and quantitative change in the general composition of air is called air pollution.

16.2 Causes of air pollution :

1. **By vehicles** all types of vehicles expels out many poisonous gases by burning of fuel. These gases like carbon monoxide, sulphur dioxide, nitrogen oxide etc, polluted the air.
2. **By industries** - the waste expelled out from industries like of chemicals, steel, manure cement, sugar etc, enhances the air pollution.
3. **Agricultural activities** - To protect the crops from pests, pesticides are sprayed. Some chemicals gets mixes in the air and pollutes it.
4. **Domestic pollution** - for cooking food, wood or cow dung cakes are used as a fuel. The smoke coming out from their burning pollutes the air similarly if domestic waste is left open it also pollutes air.
5. **Personal habits** - smoke from cigarettes also pollute air.
6. **By natural sources** - Natural disasters like volcanoes, explosions under the earth's surface, storms dust storms etc. also causes air pollution.
7. **Accidents**- Accidents caused due to human carelessness like explosion at atomic stations, fire in war equipments, gas leakage in factories etc pollutes the air in a dreadful manner.

Fig 16.2 Smoke coming out of factory

Fig 16.3 Air pollution due to automobiles

8. **Reckless cut down of trees** - Imbalance of gases due to deforestation has made atmosphere polluted.
9. **Population explosion** - Rapid increase in population also causes atmospheric pollution.

Have a look

Bhopal gas tragedy on 3rd Dec. 1984 is considered as one the major chemical accidents of the world.

Activity 1

Survey - Survey about 25 families of year locality and find out how many people are suffering from respiratory diseases.

Air pollutants and their ill effects

The substance that pollutes the air are called air pollutants. Example-carbon monoxide (Co), carbon dioxide (CO_2), oxides of nitrogen (NO_2) etc.

Ill effects of pollutants

1. Incomplete combustion of petrol and diesel results in production of carbon monoxide which is a poisonous gas. It decreases the oxygen carrying capacity of blood.
2. The lead petrol contains a harmful pollutant namely tetra ethyl lead. It is the causative agent of cancer and T.B.
3. You might have seen a thick layer of fog in atmosphere during winters. This is formed of smoke and fog and is called smog. The smoke contains oxides of nitrogen which nixes with other pollutants and dog to form smog. It cause diseases like. asthma, cough and respiratory problems in children.
4. Gaseous pollutants like sulphur dioxide or nitrogen dioxide are released from petroleum extraction center. The fuel used in electrical appliances releases sulphur di oxide. It causes lungs related diseases.
5. Chlorofluro Carbons (CFC) is an air pollutant which is used in refrigerators, air conditioners and aeroxol sprays. It harms it ozone layer of the atmosphere. Ozone layer protects us from the harmful ultra violet rays coming from the sun. Excess of CFC in atmosphere has caused a hole in ozone layer which is a serious problem.
6. Gases like sulphur di oxide (SO_2), chlorine (Cl_2) ammonia ((NH_3) Nitrous oxiole ((N_2O) creates burning sensation in the eyes and throat disease.

7. Gases emerging out of factors making aluminum and super phosphate cause many diseases.
8. Air pollution also cause damage to the plants. Sulphur di oxide causes death of plants.

Activity -2

Show the harmfull effects of air pollution on a chart.

16.4 Acid rain

The damaging effects of pollutant gases is 'acid rain' Oxides of nitrogen sulphur and carbon reacts with water and forms nitrous acid, Nitric acid, Sulphurous acid sulphuric acid and carbonic acid. They from the rain water acidic and fall on the earth along with the rain acid rain causes degradation of many of the north of many buildings of historical heritage. This is also called Marble cancer. Apart from this, the buildings, monuments, flyovers, statuses, railings and railway lines are also degraded. Pond water become acidic. pH of soil decreases which affects the absorptions by plants and the soil becomes infertile. It produces burning sensations in eyes and spin and membranes of plants and animals gets damaged.

Step taken by the Supreme court to save historical heritage.

1. Industries are instructed to use clean fuel like CNG (compressed natural gas) LPG (liquefied petroleum gas)
2. Moto vehicles of Taj Mahal area are instructed to use lead for petrol.

Activity -3

Make a Collage of pictures of historical heritage from news paper and different magazines.

16.5 Green house effects

At cold places, glass houses are made in fields or gardens for the growth of plants. These are called green house. In green house we see that the sun heat enters in but not able to escape out. That in why green house in warm.

The atmosphere of our earth also behaves like a green house. The sun rays reaches the earth passing through this atmospheres and heats up the earth's surface. Some part of solar radiations is absorbed by the earth and some are reflected back to the outer space some part of the reflected radiations stay in the atmosphere. These radiations increases the temperature of environment. This effect is called green house effect. CO_2 is responsible for this. It is beneficial to us. Without this effect life is not possible on the earth. Now, this event has become danger for the life. Excess of CO_2 in atmosphere acts like a pollutant. CO_2 prevents the heat from

escaping out of the atmosphere. Thus the average atmospheric temperature is increasing continuously. This is called global warming. The other green house gases are methane, nitrous oxide and water vapour.

Global warming :

Due to global warming, the glaciers have started metting at many places in the world. This may cause rise in sea water level surprisingly. At some places the coastal areas have already being drowned. The effects of this global warming are in the form of rain on agriculture, forests, plants and animals. We have limited time to maintain the level of green house gases at present level. On else at the end of the century, there may be a increase of 2°C which is an alarming state. Many of the countries have signed a treaty to decrease the green house gases release.

16.6 Steps for air pollution control :

1. All the industries should have gas absorbers on the chimneys.
2. Filters should be used to separate out the pollutant particles.
3. The combustion engines should be tested from time to time.
4. Ideal fuels should be used so that the expulsion of smoke and pollutant gases should be minimized.
5. Waste gases and smoke should be oxidized completely so that pollution could be reduced.
6. Industries and factories should be established at places away from cities.
7. Deforestation should be banned.
8. More and more plantation should be done.
9. Public awareness programmes should be conducted regarding environment cleanliness.
10. Lead free petrol and CNG and LPG should be used in vehicles.
11. Crackers should be banned on Deepawali to reduce pollution.

Fig. 16.4 Plantation

12. Government should carry out regular monitoring of air quality.
13. Solar energy hydro energy and wind energy should be used as alternative fules.
14. About lakhs of plants should be planted in July as a part of Van Mahotsav.
15. Vehicles should be used less.
16. Use of cycles should be encouraged.
17. Waste should be put into compost pit.

16.7 Water pollution

Water is an precious resource for life. Pure water is necessary for best health. Drinking water should be clean and free of disease causing germs. In this modern age, the industries and growing population have resulted in the addition of some undesirable substances in the flowing water (water of rivers, water falls) stored water on land (water of ponds, tanks etc) underground water (water from hand pump wells and tube wells etc). This makes the quality of water poor and its taste and colour changes. This is called water pollution.

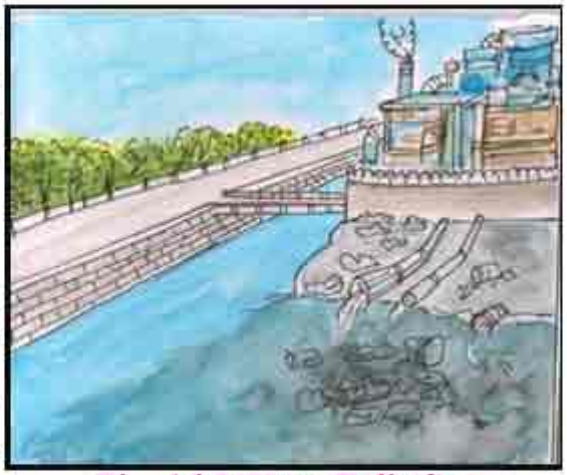


Fig. 16.5 Water Pollution

16.8 Causes of water pollution :

The main causes of water pollution are :

1. Water gets polluted due to addition of poisonous chemical waste substances polythene and other waste coming out of the industries. Water is also getting being polluted due to the addition of drains of villages and cities in water bodies.
2. Water gets polluted due to washing clothes, bathing, washing dishes, bathing the cattles, washing of vehicles discharge of excreta in the water bodies and rivers.
3. Chemical fertilizers and pesticides are added to the fields for more yield of crops. These enter the rivers or ponds along with the rain water and pollutes the water.
4. Pollution of sea water - Sea water gets polluted due to addition of polluted river water into sea. Atomic tests are carried out in oceans. this makes it polluted with radiations which is harmful.

Effects of water pollution :

- Water contanimated with sewage may contains viruses, bacteria, fungi and parasites. Which cause various infectious diseases like cholera diarrhoea, skin disease etc.

- Aquatic plants, animals do not get sufficient amount of oxygen due to water pollution. This causes adverse effect on their growth and the number of aquatic animals is also diseasing.
- Soil is also getting polluted due to water pollution and in turn soil fertility decreases.
- The chemicals expelled out of oil extraction mills, paper industries, clothes and sugar mills contains arseenic lead and fluoride. When added to agricultural land there cause toxicity in plants and animals.
- Hot water expelled out from electrical plants and industries increases the temperature of water bodies. This causes adverse effect on plants and animals living there.
- Insecticides and pesticides are used for the protection of crops. These are dissolved in water and reaches the water bodies. This causes adverse affect on plants and animals living there.
- Insecticides and pesticides are used for the protection of crops. These are dissolved in water and reaches the water bodies. These also precolete in the underground water and pollute it.

Steps taken to control water pollution

- The waste from factories, industries should not be added in the water bodies.
- The government has formulated various laws to prevent pollution. According to these laws the industrial effluents should be discharged in water only after being treated. These laws should be followed strictly.
- Atomic explosions should be avoided in sea.
- Wasting utensils, clothes and bathing the cattles in water bodies, rivers, ponds etc should be banned.
- Faecal material should not be discharged near rivers, ponds or well.
- Drinking water source should be cleaned and tested regularly.
- Domestic garbage should be thrown in the dust bins at definite place.
- Water purification plant should be established in every city and tehsil level so that pollutant could be removed from the water.

Activity - 4

Make a report of various causes that pollute water near your home and school.

Special study of water pollution :

Ganga is one of the famous holy river of India. River Ganga is also called "Ganga Mata". Ganga water remains pure even if kept for many days. It nourishes most of the North, East Indian population. World wild life Fund

(WWF) in its study has found that River Ganga is one among the world's ten rivers which are in danger of their existence. Due to the growing population and industrilization, the cities villagers and through which Ganga passes peoples discharge their huge garbage, untreated faecal material dead organisms, flowers, polythene and many harmful substances directly in it and thus river Ganga is getting polluted . To save this river, in 1985, Ganga Action Plan was started but growing population and industrialization has damaged this holy river, the Government has started a unified programme co named : Namami Ganga, But for its success, all the cooperation of the Governmental Departments and public in necessary.

Based on the above facts think and answer -

1. What are the factors that cause water pollution in River Ganga.
2. What should we do to maintain the holy image of river Ganga.
3. What efforts should be done by the government for purification of River Ganga.

Have a look

Algae-bloom

Chemicals like nitrates and phosphates profound in the waste materials, get deposited in water bodies in huge amounts. These chemicals act like the nutrients for algae. As a result alga of growth increases tremendously. This is called algal bloom. These algal uses excess of oxygen due to which level of oxygen decreases and the aquatic organisms die.

Activity - 5

Display the harmfull effects caused by water pollution on a chart.

Water Purification

Water which is suitable for drinking is called potable water. About 25% of the world's population do not get potable water for drinking. Before draining the impure water into the water bodies it should be treated chemically and physically in water treatment plants to make it pure. In public water distribution system water is treated before supplying it to homes.

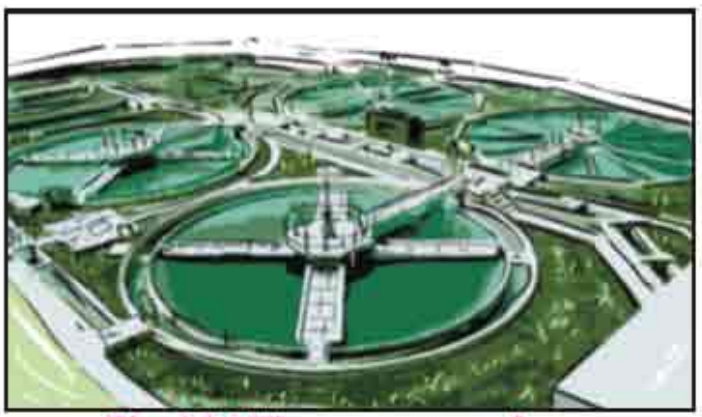


Fig. 16.6 Water treatment plant

Methods to purify water:

1. Use of domestic filter(candle filter).
2. By boiling.
3. By Chlorination.
4. By use of potash alum.
5. Use adding lime, potassium permaganate in wells to make them free of worms.

What have you learnt

- The qualitative and quantitative change in the general composition of pure air is called air pollution.
- Pollutants are those substances that contaminate air and water.
- Carbon monoxide, carbon dioxide, nitrogen dioxide, sulphur dioxide, chlorofluorocarbons, chlorine, ammonia etc are main pollutants of air.
- The increasing level of carbon dioxide, methane, nitrous oxide, water vapour is causing global warming.
- Acid rain causes degradation of marble of Taj Mahal and other historical buildings.
- Contamination of water with the substances harmful for life, is called water pollution.
- Water fit for drinking is called potable water.
- It is our moral duty to prevent water form being getting polluted.
- Water is an invaluable natural resource. We should follow the methods of its conservation.

□□□

Exercises

Mark the correct option

1. Which of the following is not a green house gas?
   (a) Carbon dioxide (b) Sulphur dioxide
   (b) Methane (d) Nitrogen
2. Which of the following is a poisonous gas?
   (a) Carbon monoxide (b) Hydrogen
   (b) Oxygen (d) Nitrogen
3. It is used in the refrigerators:
   (a) Hydrogen (b) Chlorofluoro carbon
   (b) Nitrogen (d) Oxygen
4. Holy river of India is:
   (a) Ganga (b) Bedach
   (b) Banas (d) Kosi

Fill in the blanks:

1. The substances that pollute the water are called
2. The average temperature of atmosphere is continously increasing. This is called .....
3. .....is used in aerosol sprays.
4. Clean drinking water is called .....

Match column A and B

	Column A		Column B
1.	Marble cancer	1.	Historical heritage
2.	Taj Mahal	2.	Plantation trees
3.	Save Ganga	3.	Marble degradation
4.	Van Mahotsava	4.	Ganga river project

Short answer type questions

1. Mention the harmfull effects of air pollution.
2. What is global warming?
3. What is acid rain? How does it effect us?
4. Write the methods to prevent air pollution.
5. What is green house effect?
6. What are air pollutants?

Long answer type questions

1. What is water pollution? What are the harms caused by water pollution? Write the methods to prevent water pollution.
2. Write in detail about the danger over River Ganga.

◆◆◆

Chapter 17

Environment

Points to study

17.1 Meaning of Environment
17.2 Types of Environment
17.3 Environmental Pollution
17.4 Environment conservation
17.5 Environment and Indian perspective

You might have visited nearby forest areas during rainy season. You might have also seen green trees, plants, animals, waterfalls, rivers and ponds. The rain water coming from the hills which along with it also brings soil and stone pieces on the road is also seen. Try to complete the following table with the observed objects, plants, animals and experiences with the help of your teacher.

S. No.	List		
	Name of observed things	Name of Observed plant & animal	Name of acts experience
1.	Soil, Stone,	Peepal, Dhatura	Air, Noise
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

17.1 Meaning of Environment

All those plants animals, water, air and other substances which we can see or feel, constitutes an environment.

Thus, we can say that the blanket that surrounds us is called an

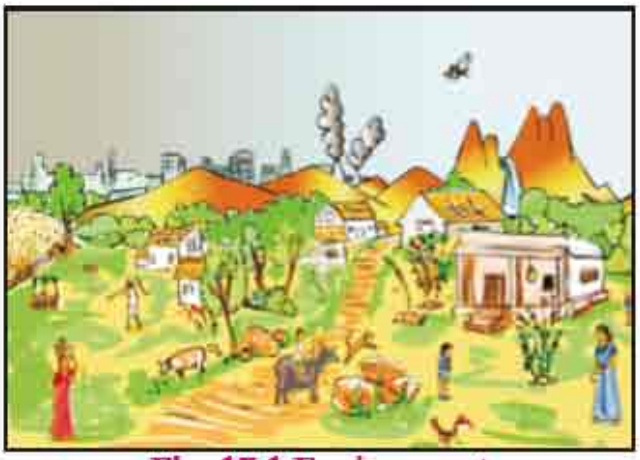


Fig. 17.1 Environment

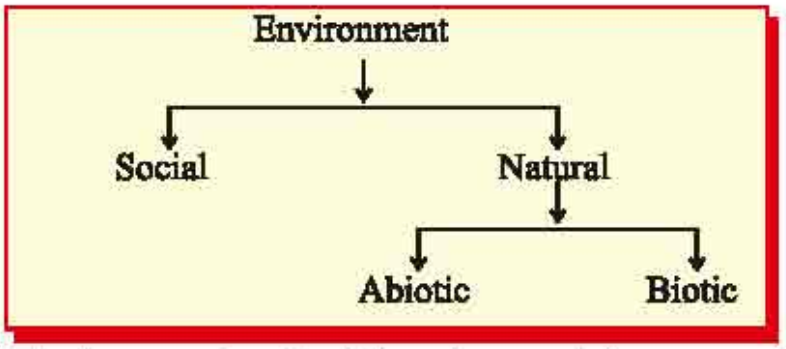
environment. Environment is the basis of existence of living organisms. Let us try to find out the types of environment.

17.2 Types of Environment

Environment can be classified mainly into two types :

1. Social environment.
2. Natural environment.

The main component of social environment is human society and other biotic and abiotic factors are components of natural environment which can be shown in the given chart below.



Social Environment : Social environment is expressed as the inter relationship of social relations. Mutual cooperation, brotherhood, coordination, duties of a good neighbour, to help in others good or bad time, patience, care of public property, respect to elders, affection for young ones, positive attitude etc. are the important factors necessary for a healthy social environment.

Natural Environment: All the plants, animals, air, water, soil etc that are found in our surroundings constitutes the natural environment, Natural environment is made up of two components.

1. Abiotic components
2. Biotic components

Abiotic components- It includes all the non living components like climatic (rain , frost, dew, humidity, wind, temperature, light) landforms and edaphic factor.

Biotic components- It includes all the vegetation (green plants), animals and micro organisms. Green plants are called Producers, animals are called consumers and micro organisms are called decomposers.

When ever you go to congested areas like traffic circle, bus stand, railway station, fair etc. wearing while clothes, then what is the effect on your white clothes ? Some black Lamp deposition appears on white clothes. Why does this happens ? Let us think.

This happens because the smoke emerging out from transport vehicles like scooter, motorcycle, car truck, jeep, bus etc. mixes with the air. Thus due to mixing of smoke in pure air, the air gets polluted. This has harm effect on the environment. And we come in contact with this polluted air a black deposition appears on our clothes. Similarly addition of undesirably substances, in water, soil and air makes then polluted.

This is called pollution. Pollution is the addition of undesirable substances in water, soil and air.

17.3 Environment Pollution.

Environment is unlimited. Clean environment is helpful in growth and development of organisms. One life gets affected by various components of environment and their various stages. At present, natural and social environments are affected by our materialistic approach.

The balanced form of all the components of an environment is called ideal condition of environment. Disturbance, even in our component of the environment affects the whole living world. These undesirable changes occurring in the various components of environment is called pollution.

In simple terms pollution means "contaminated environment."

Some types of natural pollutions are as follows:

(1) Water pollution
(2) Air pollution
(3) Land/Soil pollution
(4) Noise pollution
(5) Thermal pollution
(6) Radioactive pollution, nuclear pollution.
(7) Social pollution

In previous chapters you have studied about noise, water and air pollution. You will study about heat and radioactive pollution in higher classes. Let us study about Soil pollution here :

Land pollution / soil pollution : Agriculture is a strong pillar of our economy. The livelihood of most of the people in an agriculture dominant country, is from agriculture and livestock. Storms, floods and unwise ways of agriculture, natural resources and pollution have lowered the fertility of soil and yielding capacity. Pesticides, insecticides, fungicides and chemical fertilizers have increased the crop yield but have lowered the soil fertility. If the use of chemical fertilizers and various harmful chemicals is not controlled then in no time our land will become barren.

To control the environment pollution, we should keep our approach positive, use natural resources wisely and inspire others for the same.

17.4 Environment Conservation -

The biotic and abiotic components of natural environment and social environment are inter dependent.. Thus inter dependence is the basis of cycle of nature. To maintain this cycle of nature is environment conservation.

Role of Rajasthan in Environment Conservation : The Environment play an important role not only for humans but also for lives of animals, birds and plants also. Following are the important examples of steps taken in Rajasthan for Environment conservation.

1. Sacrifice of Amrita Devi in Khejarli village of Jodhpur.
2. Functions of KiranNidhi Organization in Piplantri village of Rajsamand.

Example of Khejarli village in Jodhpur district - That time Jodhpur Maharaja required wood for his palace. For this the soldiers selected Khejarali

Fig. 17.2 Picture of Khejadhli village

village. Near Jodhapur King's soldiers starting axing Khejri trees. When this news reached to Smt. Amrita Devi and other villagers, they ran to save the trees. Smt. Amrita Devi requested the soldiers **Not to cut the green trees as it is not right** when the soldiers refused her, she along with her three daughters and villagers hugged the trees and said means she would rather give away her life to save the trees. In this remarkable effort to save trees 363 poeple including Amrita Devi, her daughters and villagers sacrificed their lives. Every year a fair is organized in Khejarli on Dashmi of Bhadrapad.

Piplantri village in Rajsamand : Kiran Nidhi organization of Piplantri village has started a. Campaign Here the birth of a girl child is taken as a celebration. The villagers of Piplantri plant's 111trees every time a girl child is born For the protection of these trees, the villagers tie sacred thread on trees on the occasion of RakshaBandhan and take oath for their protection. It is a successful and unique programme for environment conservation.

Fig. 17.3 Girls of Piplantir village tying the know on trees

Our life style and environment conservation -

Environment friendly - Our life style should be environment friendly. Our every activity should be such that it may not harm the environment. To save the environment we can apply following life style.

1. Use the natural resources in a controlled and wise manner so that they would be available for the coming generation.
2. Use the biodegradable products in maximum possible manner.
3. Conserve the environment by recycling the used substances.

Practical aspects of life style

1. Reduce the use of water and electricity - We have to reduce the use of both. It Constructing houses with high ceilings and ventilators and using electrical appliances marked with 5 star quality mark. Reducing the electrical billing using CFL and LED and tubelights. Treat the water after bathing or washing clothes and then use it in plants. Using water according to the need only.
2. As much as possible Prohibiting such things which harms the environment.
3. Regulated and complete use - There are some articles or resources which when used completely protects the environment. Paper; Cloth, Water and food served necessary should be used completely, Natural resources should be used in a regulated manner and only according to the requirement.
4. Bio-manure - It can be prepared by from vegetable peels, rotten fruits, dried leaves broken branches etc.
5. 5 June is celebrated as World Environment Day and 22 April in celebrated as earth day. Their main aim is to create public awareness for conduct following activities

- Creating public awareness by rallies.
- Conducting poster, slogan competition, dramas and seminar.
- Organizing the community planting programme with public involvement in public areas with great enthusiasm and zeal.

Resolution for environment conservation - Environmental problems are due to a break in cycle of natures. We should give our contribution in environment conservation by taking a resolution to plant a tree on the special occasions of our life (Birthday festivals anniversary etc.)

Various levels for environment protection -We all Work together for environment protection at various levels. These levels are as follows-

Personal, family, public, working place, school, administrative level.

Fig. 17.4 World Environment Day

17.5 Environment and Indian perspective

The components the environment are always worshipped in our cultures and tradition. It is sin to cut down trees. After Bath, Plants and trees are watered, sun is worshipped which in the biggest source of energy.

Fig 17.5 various levels for environment

Our lifestyle is helpful in environment conservation and environment conservation has been given importance in our Indian culture also. Human has unbreakable relation with the nature. Our ancient sages also have said that "yat pinde, tatt brahmande" "Sanskrit Slok" which means the elements of the body are same as the elements of nature.

Earth, water, air, fire and sky are the major components of the environment. Our body is also made up of these five elements. And our lives will be safe by protecting these five elements of the environment.

We think of earth as your mothers we conserve water rivers, mountains, trees, water bodies, air etc. as we consider them worshippoble it is tradition to water plants.

Our grandmother, mother used homemade methods in place of chemicals to protect grains, spices and pulses etc. For example keeping driedneem leaves in wheat, a line of turmeric powder to keep ants away etc. These traditional methods are helpful in protection of the grains etc without harming the environment.

In our culture, the animals are treated as of God and Goddess. Snakes are worshipped on Nagpanchmi, Cows are worshipped on BachhBaras, Crows are served with kheer in Shradh, feeding ants with Til and flour, birds with grains, cows and dogs with chapati etc. These examples show that our culture has given importance to the organisms by having a mercy on them.

On different festivals, the tradition of preparing different dishes and vegetables curries is also an example of conserving vegetables and cereals so as to prevent their extinction.

Fig 17.6 Students taking resolution for planting.

Peepaltree, Banyan tree,Amla, Tulsietc are worshipped. Many plants have medicinal importance which are used in our daily lives. The Mantras and Hawan ingredients used during Hawan and Yagya are also helpful in purifying the environment.

What have you learnt

- The blanket, surrounding us is called an environments.
- Natural environment is made up of biotic and abiotic components.
- Pollution - water pollution, air pollution, soil pollution noise pollution, heat pollution, atomic pollution social pollution.
- To protect the environment we should follow environment friendly lifestyle, wise regulates limited and just use of natural resources and their reuse and recycling.
- 5th June is celebrated as World Environment Day and 22nd April is celebrated as 'Earth Day'
- Efforts should be carried at various levels to save environment.
- We should plant trees on special occasions of our life and should take resolution to take care of them.

EXERCISES

Mark the correct option

1. The biotic components of natural environment is-
   (a) Plants (b) mountains
   (b) Fields (d) water
2. What does the pollution in simple terms means?
   (a) Uncontaminated environment
   (b) contaminated environment
   (b) Uncontaminated and contaminated environment
   (d) nice environment
3. Which of the following is not included in the environmental friendly life style?
   (a) Limited use (b) controlled use
   (b) Wise use (d) unlimited use
4. When is the world environment day?
   (a) 21 June (b)05 June
   (b) 2 october (d) 14 november

Fill in the blanks

(a) The blanket covering us on all sides is called ----------
(b) The five element mentioned in the Indian culture are ----------
(c) Abiotic components include ----------
(d) Soil pollution has resulted in the decrease in fertility and ---------- of soil.

Short answer type questions:

1. Write the types of environment.
2. What is pollution? Mention its types.
3. What resolution will you take to protect the environment? Write them.
4. At what levels efforts can be made to protect the environment? Mention.

Long answer type questions:

1. Explain the Indian perspective for environment and its conservation.
2. Throw a light on the role of Rajasthan in environment conservation.

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Chapter
18

Carbon and fuel

Study points

18.1 Presence of carbon

You might have seen the blackness on kitchen walls, glass of lantern, temples where Deepak is lighted. Likewise we have seen smoke from burning of paper, sugar, wood, food oil, clothes and even smokes from vehicles. All the above material contains carbon in major quantities which is seen as black residue. Do following activity to understand the presence of carbon.

Activity 1

Fill a mud Deepak with oil. Now put lamp light (cotton batti) in it. Light it with the help of a match stick. You will observe that cotton starts burning with a yellow flame. Now put a transparent glass slide on this flame in such a way that flow of air does not block. After sometime remove glass slide and observe it. What do you observe over it? You will notice a black layer which is oily on touch. This is a type of carbon called lamp black. This we obtained due to incomplete combustion of oil.

Till now is known as 98 natural elements obtained on or 118 elements. Carbon is the only element which is found in every living organism and in maximum food materials. It is an important element among the 92 elements found in nature. Its symbol is C. The word carbon is formed from a Latin word 'carbo' means coal. The black mark on paper with pencil, kajal of eyes, coal, etc. are carbon only. Carbon is found in free or combined state in dead (life less) things also.

Substances found in nature like sugar, glucose, tea, milk, coal, petrol, diesel, natural gas kerosene, urea, diamond, graphite, etc all contain carbon. Let us discuss in detail the presence of carbon.

18.2. Allotropes of carbon:-

Coals, lamp black, graphite, diamond, are all examples of free forms of carbon. All these are different forms of carbon which we called as allotropes of carbon.

An element found in two or more forms with same chemical properties but having different physical properties, called as Allotropes. The property of element is called Allotropies

Crystalline allotropes of carbon

The allotropes which have a particular or specific structure are crystalline allotropes of carbon. Example: diamond, graphite, fullerenes.

Non crystalline forms of carbon

The allotropes which do not have any fixed structure or geometry of carbon atoms are called as Non crystalline structure of carbon. Examples - coal from wood, lampblack. Etc.

Difference between graphite and diamond

We can differentiate between graphite and diamond as shown in given table 18.1 & 18.2.

Fig 18.1 structure of diamond

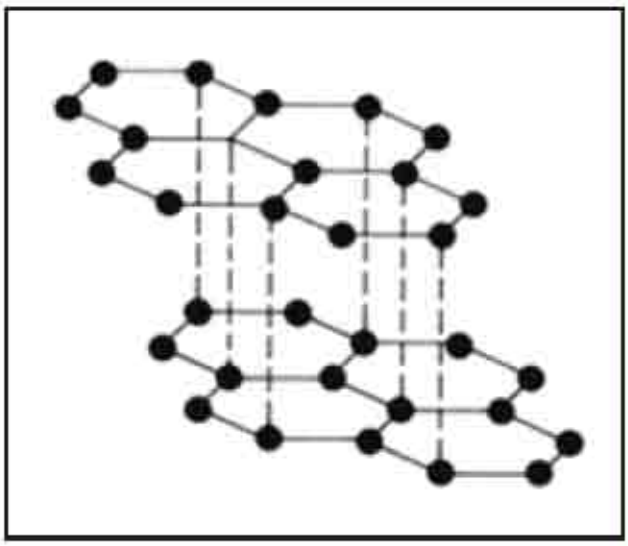
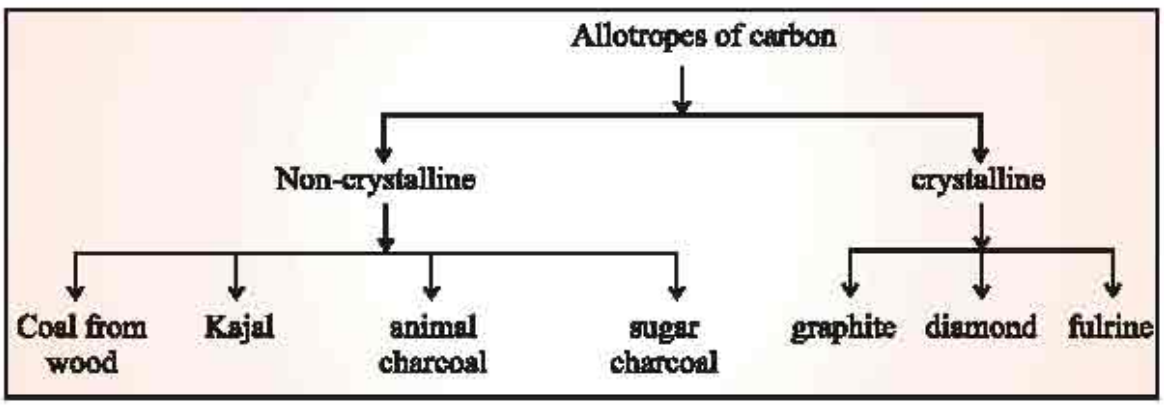


Fig 18.2 structure of graphite

Table 18.1 Difference between graphite and diamond

Properties	Graphite	Diamond
Soft/hard	Graphite is a powdered substance which is oily and gliding in nature	Diamond is transparent and hard.
Structure	Graphite form a hexagonal structure by attaching with three other carbon atom in one dimension only Likewise many layers remain attached to each other through weak bonds, so that one layer slides on another layer. Therefore they are soft.	Carbon atom in diamond forms a tetrahedral structure by joining with 4 carbon and form a three dimension structure.
Electrical conductance	This is conductor of electricity	This is insulator of electricity but conductor of heat
Uses	It is used in pencil, dry cell and in electric arc.	It is used in jewellery, in cutting glasses, in grinding, in making holes.



18.3 Carbon - Important component of fuel.

In daily life we use LPG (Liquefied Petroleum Gas), wood biogas etc as fuel to cook food. Fuel is that substance by the combustion of which heat is obtained. In most of the fuel carbon is found in element or in compound form.

The source of energy in modern age is fuel. Its consuption is rising day by day. Fuel is used as a source of energy in industries, roadways, sea and air transport. Carbon is an important component in all fuels like - petrol, diesel, kerosene, wood coal etc.

We use fuel as a source of energy in our daily life. Write the name of fuel used in following work in table 18.2

Table 18.2 Fuels used in different work.

S.No.	Work or Machine	Fuel used	S.No.	Work or Machine	Fuel used
1	Cooking	LPG	5	Car	Petrol or diesel
2	Heating of water		6	Tractor	
3	Prepare tea		7	Pumping set	
4	Generator		8	Thresher	

18.4 Sources of fuel:-

1. **Biomass:-** The substance present in plants and animals is called biomass like-wood, agricultural waste, cow dung etc.
2. **Crude oil wells:-** Fractional distillation of crude oil yields petrol and other fuels.
3. **Coal mines:-** Coal is obtained as stone from mines.

Fuel is found in all three states of matter.

- Solid fuel: Wood as coal, coal of mines, cow dung, and agriculture waste are all solid fuel.
- Liquid fuel:- Kerosene, Diesel, petrol, gasoline, alcohol etc are liquid fuel.
- Gaseous fuel:- biogas, water gas ($H_2 + CO$), coal gas, producer gas ($N_2 + CO$), natural gas, LPG (Liquefied Petroleum gas) etc are gaseous fuels.

Coal (Solid fuel):

Millions of year ago there were dense forest at eastern lower watery region. Due to natural disaster like flood, these forests buried inside the land and they got compressed due to heavy deposition of soil. Because of high temperature and pressure inside the earth they get converted into coal. The gradual process of formation of coal from dead vegetation in called carbonization. Carbon is the dominant element of coal. As it is formed from plants it is also an organic fuel.

Coal is divided into four types on the basis of carbon content in it.

1. Peat (60% carbon)
2. Lignite (67% carbon)
3. Bituminous (80% carbon)
4. Anthracite (90-98% carbon)

Petroleum (Liquid fuel)

Petroleum is used in almost all vehicles like scooter, motor bike, car, bus, truck etc.

Let us know how petroleum is formed.

Petroleum is formed from the organisms and vegetation of sea. Because of geographical disturbances many plants and animals get buried under sea. Due to high pressure and temperature and absence of air these dead plants and animals converted into petroleum and natural gas in laces of year.

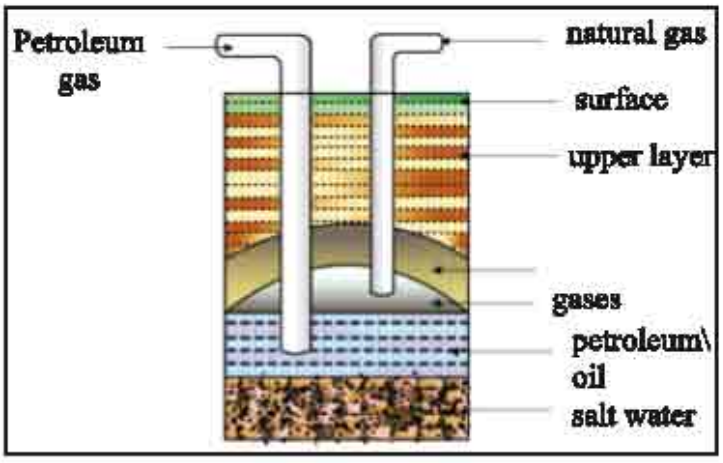


Fig 18.3 extraction of petroleum

First petroleum well of the world was drilled in Penisiluama, America in 1859. After eight years of this discovery in 1867, Mecum of Assam is discovered as oil storage place.

In Rajasthan, Mangla, Bhagyam, Aishwarya, Guda, Rajeshwari, Saraswati, Kameshwari well was discovered in Barmer, Besider there Gujarat, Mumabi, Godawari, Krishna river basin also discovered as oil well in India. The Petroleum is formed from two words of Latin Petra means rock and oleum means oil. It is also called mineral oil as it is found under rocks inside the earth.

Petroleum is also called as liquid gold. Petrol is more expensive than gold for any country in present era. It is used in agriculture, industry, communication, transport etc.

Extraction of Petroleum:-

Petroleum is extracted from fractional distillation of crude oil.

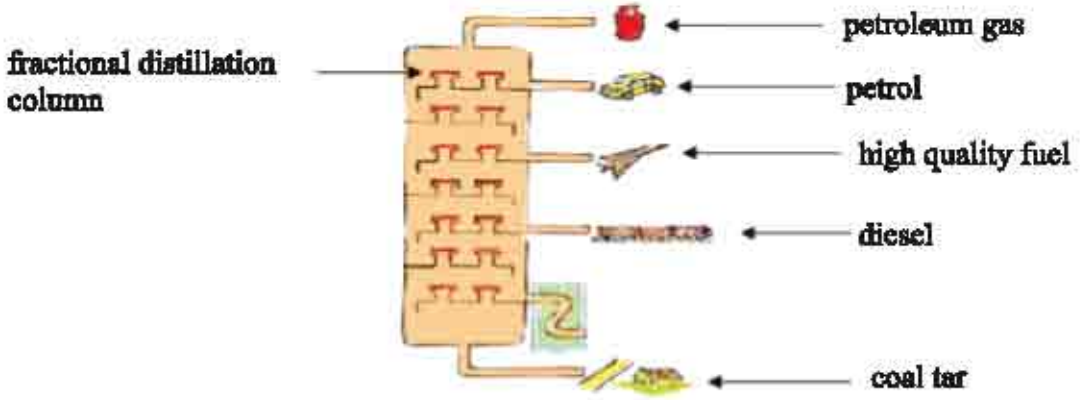


Fig 18.4 fractional distillation of petroleum

Look at picture 18.4. Petrol and petroleum gas is above the layer of diesel in the diagram. Why oil and gas are lighter than diesel?

Petrol is dark brown in colour and is dense oily liquid. This is a mixture of many hydrocarbons. Extracted petroleum is in the form of crude oil and is not used as it is. The component of petrol like petroleum gas, petrol, neptha, diesel, kerosene etc. has different boiling points. Crude oil is filled in fractionating column (vertical cylindrical container) and heated slowly. First petroleum gas, than petrol, neptha, kerosene, diesel change into vapor and moves upward in the column, which are then condense at different level and collected separately. This process is called fractional distillation.

1. **Petroleum Gas:-** Petroleum gas get separated at 250°C to 300°C temperature in fractionating column. It is mainly used in vehicles and in Kitchen as fuel. It is mainly a mixture of ethane, propane, butane, isobutene etc. This gas can be easily liquefied at high pressure, which is called Liquefied Petroleum Gas (LPG). At the time of packing Mercaptan (Thiol) is mix with it so any leakage of gas can be identified with its smell. Use of LPG is increasing day by day. This gas gives more heat in less time. It do not pollute atmosphere and does not produce ash.
2. **Petrol:-** At 30°C to 120°C temperature in fractioning column petrol in obtained. It is used as fuel in vehicles and in Dry cleaning.
3. **Neptha:-** It get separated at 120°C to 180°C. temperature. It is used as fuel and in chemical reactions.

Fig 18.5 Mangla petroleum, Barmer

4. **Kerosene:-** It get separated at 180° C to 260° C. Used in stoves, lamps, jet planes, chimneys etc.
5. **Diesel:-** Obtained at 260°C to 340°C. Used in heavy motors, truck, tractors, generators etc.
6. **Lubricants:-** At 350°C lubricants are separated.
7. **Paraffin wax:-** Used in wax, shoe polish, wax paper etc.
8. **Dammar/coal tar:-** It get separated at 600°C of temperature. It is the last residue of fractional distillation. It is used in construction of road.

Let us know it also

Compressed natural gas (CNG):- The gas obtained from extraction of petrol is called natural gas. The main gas is methane (CH_4) in it. It is used in vehicles as fuel. It is compressed and fills in cylinders, and hence called as compressed natural gas.

Petroleum is a non-reversible source of energy as it is a product of a process of million years. The sources of petroleum are limited, which can last for only few years. The use of petrol and diesel like fuels increases the pollution level, so we should use sensibly. If we use more petrol, diesel etc. then it may possible that in few years these get finished.

18.5 Combustion:-

The combustion is burning of any substance in the presence of oxygen

Activity 2

Burn a candle. It produces light and energy. If you cover this candle with any container what will you observe? The candle stops burning after sometime. Why does it happen? Let us understand:

For burning of any substance oxygen is required. The temperature at which any substance burn is called burning temperature. If any substance gets sufficient oxygen it burns with blue flame and is called complete combustion. Example combustion of LPG.

If a substance burn in insufficient amount of oxygen, it burns with yellow flame. It is called incomplete combustion. Example: combustion o wood. The incomplete combustion of any substance pollute environment.

Combustion: a chemical reaction that occurs when oxygen combines with other substances to produce heat and usually light. It is called combustion

List the substances undergoing complete and incomplete combustion. For combustion of any substance the following three things are necessary.

1. Oxygen
2. Particular or optimum temperature
3. Fuel

You might have heard that in summer season due to high temperature, dry grass capture fire and even forests came under fire. Sometimes coal dust in coal mines starts burning automatically. Why it happens? Think and Discuss with your classmates.

18.6 Energy conservation:-

You have learned about natural source of fuel in this chapter. These can be exhaust at any time. You know that coal and petroleum are Biomass fuel, laces of year required for the conversion of dead plants and animals into fuel. On the other side these get exhausted in few hundreds of year. These are related or responsible for global warming. Therefore it is important for us that these fuels should be used at utmost necessity. Due to which environment may be conserved, less chance of Global warming and fuel will be available for longer time.

PCRA (Petroleum Conservation Research Association) in India advice people how to conserve petrol and diesel while driving:-

1. Drive your vehicle with constant and medium speed.
2. Switch off the engine on red lights.
3. Maintain your vehicle and keep the air presence absolute in tyres.

What you have learnt

- The blackness on burning lantern, lamp etc is of carbon.
- The symbol of carbon is 'C'.
- Carbon is found in as free or combined state.
- Allotropes are substances with similar chemical proportions but different physical properties. Carbon has two allotropes, crystalline and non crystalline.
- The structure of graphite is hexadiagonal. (Structure of diamond is three dimensional and it has continuous network of tetrahedral carbon atoms.)
- Carbon is important component of fuel.
- The sources of fuel are Biomass, wells of crude oil, coal mines etc.
- Fuel is of three types (1) Solid fuel (2) liquid fuel (3) Gaseous fuel
- LPG gas is used for cooking as domestic fuel.
- Fractional distillation is done in industries and many substances are obtained from it - like - Natural gas, petrol, diesel, kerosene, Neptha, wax, lubricants coal tar etc.

Exercises

Choose the correct option:

1. The coal in which carbon content is highest?
   (a) Peat (b) Lignite
   (c) Anthracite (d) Bituminous ( )
2. The residue of fractional distillation of petroleum is.
   (a) Lubricant oil (b) wax
   (c) Coal tar (d) Diesel ( )

3. The crystalline allotrope of carbon is.

(a) Coal (b) Kajal

(c) Charcoal (d) Graphite ( )

Fill in the blanks:

1. _____ is the domestic liquid fuel.
2. In graphite each carbon atom is attached to _____ nearest carbon atoms while in diamond each carbon atom is attached to _____ nearest carbon atoms.
3. _____ is necessary for combustion.

Put right (✓) for correct and wrong (×) for incorrect of the following.

1. The carbon content in Lignite is 67% ( )
2. Peat coal is an example of liquid fuel ( )
3. Lubricant oil is used as fuel in vehicles and kitchen ( )
4. The crystalline allotropes of carbon are diamond, graphite and fullerin. ( )

Short answer type questions:

1. Write uses of petroleum gas.
2. We should sensibly use petrol and diesel like substances? Explain why?
3. Write differences between diamond and graphite.
4. Compare LPG and wood as fuel.
5. Name five compounds of carbon.

Long answers type questions.

1. Draw a well labeled diagram of diamond and graphite and explain their difference.
2. Write your views in the following table and also discuss with other students.

Advantages of uses of petroleum as fuel	Disadvantages of uses of petroleum as fuel

3. The use of petrol, diesel and kerosene is rising day to day. Their smoke is mixing with air and causing air pollution. Write your suggestions and views for reducing air pollution.
4. List the fuel used in daily life.
5. Draw the diagram of extraction of petrol and label it.
6. Differentiate complete and incomplete combustion. Explain with example.

Activity work

1. Prepare of comparison between types of coal.
2. Prepare a model of fractionating column with the help of cardboard and plastic pipes.
3. Write a note on extraction of petroleum in Rajasthan.

◆◆◆

Road Safety

Road Accident

If we do not follow rules while moving on road ways. What will happen? Let us think on it.

Driver do not follow rules while driving then vehicle collides with another vehicle. It means due to road traffic minor or major injuries are caused.

This is called 'Road Accident'. Because of this, sometimes it lead to death of a person, so on the road driver should obey the road traffic properly.

Reason of Road Accidents

What is the main reason of road accidents? Did you ever try to know? Let us try to know main reasons of road accident. Road accidents do not occur only because of carelessness but also because of high speed.

In developing countries 64% to 95% road accidents happen due to driver's mistake. Important points is that there is a reason behind every road accident. Which are as follows -

1. Fast speed of vehicle,
2. Carelessness of driver
3. Drinking while driving
4. Not following the traffic rules.
5. Ignoring wearing helmet and seat belt while driving.

Do you Know?

- Every year 1.38 lakhs people die in road accident in India and about five lakhs people are injured.
- In Rajasthan, every year about 9000 people die in road accident and about 23000 are injured.

Adworse effects of road accident

Effect of a road accidents fall on family, society, state and on country. Road accidents badly affect the patient and their family. Some examples are as follows -

1. Lost of vehicle or property
2. Economical loss
2. Government and Legal actions taken
4. Person being handicapped or died.

Some basic ideas to stay away from road accidents - What can reduces in these road accidents? Let us know about it, how can be safe from road accidents - e.g. use of helmet or seat belt, compulsion of license for drivers, so follows informational indication which is shown on roadways, to drive vehicle normally, to park vehicle on appropriate place, to use white zebra crossing while ready to cross a road, do not driven when drunk, use of indicator while changing lane, well known about traffic light and drive by its indication.

Do you know ?

1. After completing about 16 years old age, a temporary license can be provided for non-gear vehicle.
2. After completion of 18 year old age, permanent license card is provided for gear vehicle.

Road security, a public issue

Being a civilian, everyone should follow the rule of road security. By which we can stop road accidents. So that, we can give safe and secure future to our society and country.

Important Numbers :	
• Police	100
• Fire	101
• Ambulance	102
• Emergency helpline	108
• Women's security helpline	104