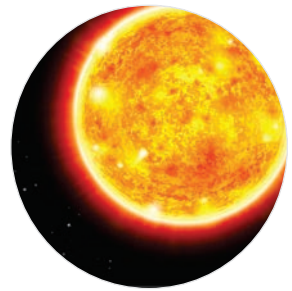


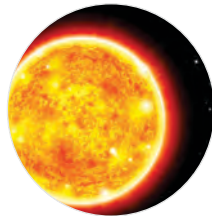
Pruquest

SCIENCE



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SCIENCE



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PREFACE

The *PruQuest Science* series comprises eight textbooks from grades 1 to 8, aligned with the vision and theme of the *National Curriculum Framework 2005*.


The *PruQuest Science* series aims at nurturing inventiveness, creativity and competence in children. The books of grades 6 to 8 try to achieve this by inculcating the following in learners:

- scientific skills
- scientific values and temperament
- awareness and sympathy towards the environment

In this endeavour, the series includes numerous well-structured activities, hands-on experiments, enquiry-based questions, assignments, creative projects and well-formulated questions, which address the different cognitive levels of children and discourage rote learning. This makes the series not an overload of information but a journey that each student will enjoy as a participant in learning process, rather than being only the receiver of knowledge.

The *PruQuest Science* series has adapted an interactive format and attractive lay out to make the books appealing for the children of the respective age groups.

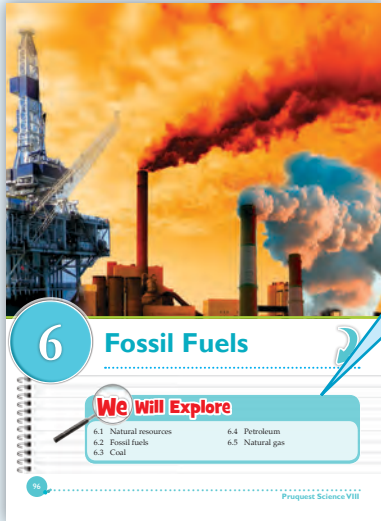
Each book in the series is accompanied by a teachers' resource in the form of a CD and a Manual and a student CD.





Key Features

The content has been presented in a child-centric manner with the help of the following key features:



We Will Explore: This feature presents the learning objectives that are to be covered in the chapter.

Precursor: A warm-up exercise in the form of hands-on/practice exercise that connects to the real life or relates to the knowledge previously gained is presented at the beginning of the chapter, through which the child is drawn to the unknown world from the known.

Activity: These are the hands-on activities/experiments that connect the concepts of science to the real world. Interesting activities are presented in this section in a well-structured format.

Activity 11.6

Aim: To show that pressure depends on the area on which it is applied.

Materials required: a brick and a large tray containing wet sand

Procedure:

Place the brick on the wet sand in three different ways as shown in Figure 11.21.

Observation: Are the impressions same on the wet sand in the three cases?

Conclusion: The impression on sand is the deepest in the case of minimum base area. The impression is most shallow in the case of maximum base area.



Figure 11.21

Sci-Info: This section presents the application of scientific concepts in real-life.

Sci-Info

Project Tiger is a tiger conservation programme launched in the year 1973, by the Govt. of India led by the Prime Minister Indira Gandhi. The tiger population was 40,000 at the beginning of the 20th century. In 1970, their number came down to 1800. Thus an immediate action plan was needed to save Indian tigers, and the result was the launch of Project Tiger. The main aim of Project Tiger was to create safe and ideal environmental conditions for the survival and growth of tigers.

In the beginning, nine reserves were identified such as

Manas (Assam), Simlipal (Odisha), Palamau (Jharkhand), Corbett (Uttarakhand), Kanha (Madhya Pradesh), Melghat (Maharashtra), Bandipur (Karnataka), Ranthambore (Rajasthan) and Sundarbans (West Bengal).

One of the best examples of the success of Project Tigers is the famous **Bandipur Tiger Reserve**.



Figure 7.10

Enquire and Discuss 11.2

All the objects try to resist any change in their shape when force is applied. We are able to deform the shape of a few objects easily, whereas for others, we need to apply much greater force. We can deform the shape of a rubber band easily by applying less force with our hands.

Can you stretch metal wires or ropes?

Check which metal is used in the rope of cranes to pull heavy

objects. Does the metal rope stretch?



Figure 11.9

Enquire and Discuss: In this section, students are asked to enquire about some scientific concepts that we experience in real-life, discuss open-ended questions or investigate a real-life situation that leads them to acquire extended knowledge.

Teacher's Corner: It is a guiding tool for the teacher to help the child understand the concept in a better way.

Off the Wall

Aluminium is widely used in shipbuilding because it is non-reactive towards water. Ships made from aluminium alloys corrode 100 times slower than steel. During the first year of operation, steel corrodes at a speed of 120 mm/year, while aluminium at a speed of 1 mm/year. When exposed to air, aluminium forms a hard, protective coating of aluminium oxide. This layer of aluminium oxide protects the underlying aluminium layer, thus providing resistance to corrosion in marine environments for both fresh water and salt water.



Figure 4.8 Ship

Off the Wall: This section presents interesting extended information related to any scientific concept.

Science Diaries

1. In the early 1900s, seismologist Richard Dixon Oldham found that when an earthquake occurred, P and S waves showed up on seismograms all over the world. He realised that seismic waves could be used to learn about the earth's interior. Today we know so much about the interior of the earth because of these seismic waves.
2. It is believed that the first seismograph was invented by the Chinese philosopher Chang Heng in AD 132. It consisted of a large urn with eight dragon heads popping out of it and a toad with its mouth open squatted below each dragon (Figure 15.21). Heng could tell the direction of the shaking by the ball released from one of the dragons' mouth.
3. The Richter scale was invented in 1935 by seismologists Charles F. Richter and Beno Gutenberg. On the Richter scale, each step up in magnitude (from 3.0 to 4.0, for example) uses 30 times more energy than the one below it.

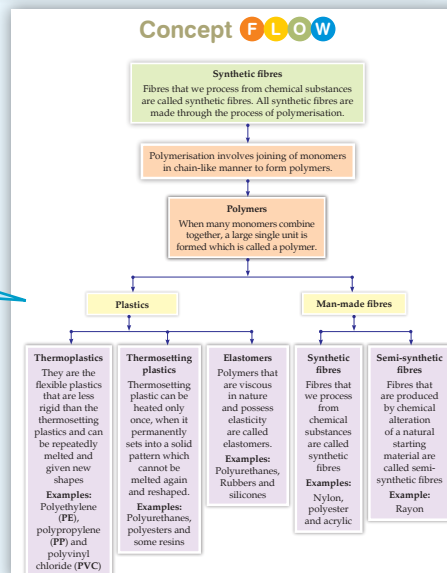


Figure 15.21

Science Diaries: This section presents the related history about the discovery or the invention.

Concept Flow: At the end of each chapter, the key concepts and the relations among them are presented in a unique and logical way.

Flow Charts, Tables and Graphs: To reinforce learning, colourful flow charts, tables and graphs relevant to the concepts are presented wherever possible.



The assessment part is also a learning tool that includes a variety of questions to address different cognitive levels and multiple intelligences in children. This part is divided into six levels, moving from the lowest to the highest order according to the Bloom's taxonomy.

Check your knowledge: It includes knowledge-/recall-based questions.

Think and Apply: This section includes questions where children have to apply the acquired knowledge/concept to real life.

Analyse: This part includes questions in which the children use analysing skills to solve problems.

Think Beyond: This part includes questions based on higher-order/critical-thinking skills.

Values to learn: This part includes activities that help in inculcating life skills and values (self-awareness, decision-making, empathy, compassion and respect) in the child.

Create and Learn: This section emphasises on the synthesising skill and creative thinking.

CD-ROM: Each book in the series is accompanied by a teacher resource in the form of CD and a teacher's manual.

Contents

Unit 1.

FOOD

1. Agriculture : Crop Production..... 1-21
2. Microbes : Good and Bad..... 22-40

Unit 2.

MATERIALS

3. Synthetic Fibres and Plastics 41-57
4. Metals and Non-metals 58-79
5. Combustion and Flame 80-99
6. Fossil Fuels 100-118

Unit 3.

THE LIVING WORLD

7. Conservation of Plants and Animals 119-134
8. Cells : Building Blocks of Life..... 135-152
9. Age of Adolescence..... 153-168
10. Reproduction in Animals 169-185

Unit 4.

MOVING THINGS

11. Force and Pressure..... 186-206
12. Friction..... 207-219
13. Sound..... 220-238

Unit 5.

WORKING OF THINGS

14. Chemical Effects of Electric Current..... 239-253

Unit 6.

PHENOMENA

15. Some Natural Phenomena..... 254-273
16. Light..... 274-295
17. Stars and the Solar System 296-312

Unit 7.

NATURAL RESOURCES

18. Pollution of Air and Water..... 313-329

Revision test 1 to 4..... 330-333



1

Agriculture: Crop Production

We Will Explore

- 1.1 Crops and agriculture
- 1.2 Agricultural practices
- 1.3 Agricultural implements
- 1.4 Basic steps of agriculture
- 1.5 Food from animals

How many of you have a garden or at least a flower pot at home? Have you ever wondered how the plants grow and what are the things required by the plants, such as we need food and nutrients, to grow? List out the materials required to plant/grow any kind of plant.

Plants are good for our environment. We get food, fibres, spices, medicines, rubber and many other useful products from plants. Moreover, trees give out oxygen and keep the environment clean. We should plant trees and ensure that they grow into healthy trees.

Rohan decides to join the 'Green Tree' club in his school and volunteer to plant a tree in his neighbourhood. He gathers some seeds from his club and gets some tips on planting and maintaining it from his teacher. He quickly writes them down on a sheet of paper. He realises that the main steps of planting and maintaining a tree are same as those followed in agriculture. Can you guess the common steps?



Figure 1.1 Steps in growing and taking care of a tree

1.1 Crops and Agriculture

Do you know what crops are?

CROPS

Crops are the plants that are grown in large numbers to provide food, clothing and other products in a particular area during a particular season.

Crops are of different types such as cereals, pulses, vegetables and fruits. They can be categorised into different types on the basis of their use and the season in which they grow. On the basis of their use, crops can be categorised into food crops, fibre-giving crops, oil-producing crops and industrial crops such as castor and tobacco. Some common crops grown in India are given in Table 1.1.

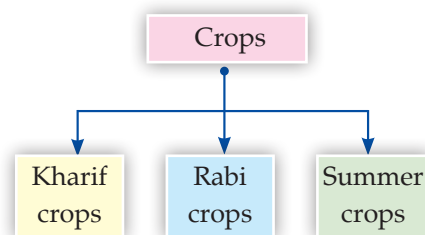
Table 1.1 Common crops grown in India

Cereals	Rice, wheat, maize, barley, oat
Pulses	Gram, green gram, black gram, chickpea
Vegetables	Onions, potatoes, cabbages, carrots, tomatoes
Fruits	Mangoes, apples, oranges, pears, guavas
Oil seeds	Cotton, mustard, soybean, groundnuts, sunflowers
Sugar crops	Sugar cane, sugar beet
Spices	Coriander, cumin, black pepper, clove, ginger, garlic
Fibre crops	Cotton, jute, hemp, coconut
Beverage crops	Tea, coffee

On the basis of the season in which they grow, crops are classified into kharif, rabi and summer crops.

Kharif Crops: The crops which are grown in the rainy season are called kharif crops. The period of growing kharif crops is from June to September. Crops such as rice, maize, cotton and groundnuts are examples of kharif crops.

Rabi Crops: The crops which are grown in the winter season are called rabi crops. The period of growing rabi crops is from



October to March. Crops such as wheat, pulses, mustard and barley are examples of rabi crops.

Summer Crops: The crops which are grown in the summer season are called summer crops. The period of growing summer crops is from March to May. Some pulses and vegetables are grown in this season.

Enquire and Discuss 1.1

On a worldwide basis, wheat and rice are the most important crops, accounting for over 50% of the world's cereal production. But both the cereals are grown in different seasons. Rice is grown during the rainy season, and wheat is grown during the winter season. Discuss the following:

- 1 What happens when wheat is sown in the rainy season?
- 2 What happens when rice is sown in the winter season?

Science Diaries

The history of farming and agriculture begins about 12,000 years ago. Primitive man was a food gatherer and a hunter. He moved from place to place hunting animals and collecting seeds, fruits and vegetables. Later he learnt to grow seeds and raising crops. Then he became a farmer. He also started domesticating animals. Thus, the concept of agriculture was born.



Figure 1.2

AGRICULTURE

The practice of growing crops and rearing animals on a large scale to provide food, fibre and other products is called agriculture.

The land where crop is cultivated is called **field**. Before sowing seeds, farmers prepare the soil by tilling and adding required quantity of manure and fertilisers. It helps the plant grow well. Growing crops require proper and timely watering. After the maturation of crops, they are harvested. Later they are stored. Farmers may also decide what all crops they want to harvest from the land. All these activities are called **agricultural practices**. For all these activities, farmers need to use various tools. These are called **agricultural implements**.

1.2 Agricultural Practices

These are certain commonly used practices used in agriculture to improve and increase agricultural production. Crop rotation and mixed agriculture are two such practices.

Crop rotation: It is type of practice in which a series of different crops are grown in same area.

Advantages of crop rotation:

1. Crop rotation helps in balancing the nutrient in the soil. It involves growing a number of different types of crops, one after the other, in the same piece of land. These different crops are cultivated as per the season which suits them. Growing the same crop depletes the soil of a set of nutrients. Crop rotation not only prevents this from happening but also increases soil fertility and crop yield. Crop rotation between a crop, which requires a lot of nitrogenous nutrient such corn, and leguminous plants such as soybeans can help maintain a healthy balance of nutrients in the soil.
2. It also helps in reducing soil erosion as the soil is never left exposed.
3. It may protect the plants from diseases and pest. For examples, soybean plants are resistant to certain rootworms but corn is not. Therefore, crop rotation between soybean and corn suppresses the growth of this pest.



Figure 1.3 (a) Crop rotation between sugar cane and cassava plants

Mixed cultivation: In this, farmers grow two or more different types of crops in the same field, simultaneously.

Advantages of mixed cultivation:

1. It provides financial security as farmers may earn a bigger profit.
2. It yields different crops throughout the year, which ensures uninterrupted production of crops.
3. Mixed cultivation may cater to different market needs at the same time.
4. It may also protect the farmer against crop failure because the growing conditions for different crops are different and all the different crops may not fail at the same time.



Figure 1.3 (b) Mixed cultivation of various crops

1.3 Agricultural Implements

Various tools are used in the cultivation of plants. Some are used manually, whereas others are used with the help of some animals such as bullocks and camels. A list of common tools and their uses are given in Table 1.2.

Table 1.2 Tools and their use

Name of Tools	Uses
Wooden plough	For ploughing
Iron plough	For ploughing
Cultivator	For ploughing
Leveller	For levelling and pressing the soil
Seed drill	For sowing
Sprayers	For spraying insecticides
Harrow	For weeding
<i>Khurpa</i> /Hoe	For weeding and loosening soil
Sickle	For harvesting
Combines	For harvesting and threshing

TOOLS FOR PLOUGHING

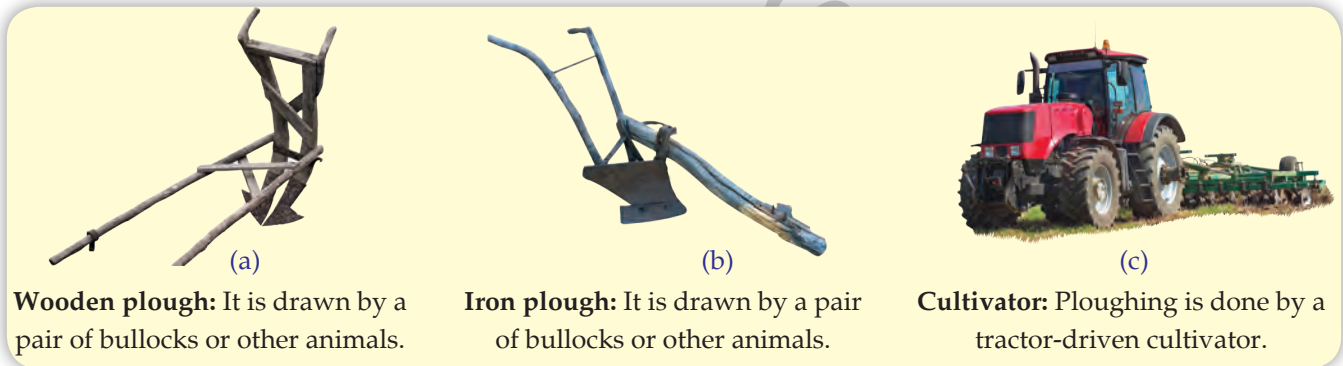


Figure 1.4 (a) Wooden plough, (b) iron plough and (c) cultivator

TOOLS FOR SOWING AND SPRAYING WEEDICIDES

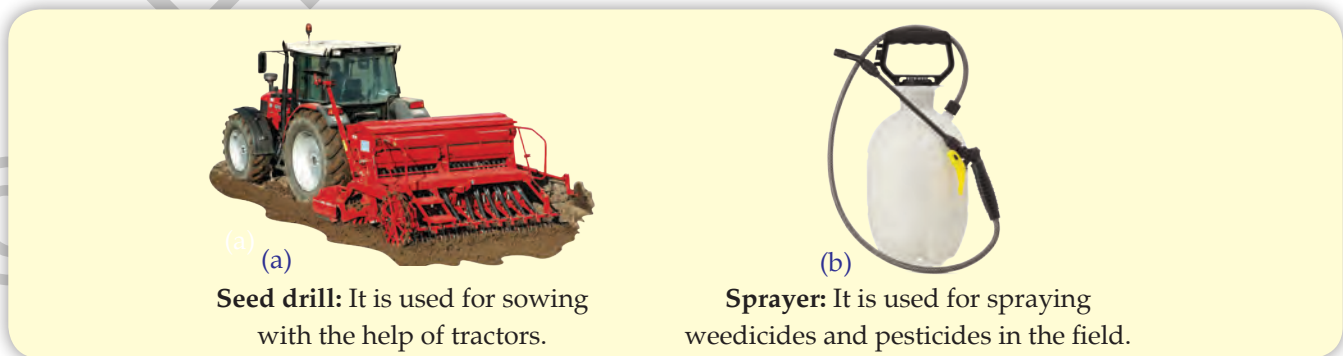


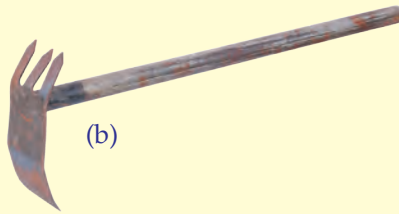
Figure 1.5 (a) Seed drill and (b) sprayer

TOOLS FOR WEEDING



(a)

Trowel (*khurpa*): It is used for manual weeding.



(b)

Hoe: It is used for removing weeds and for loosening the soil.

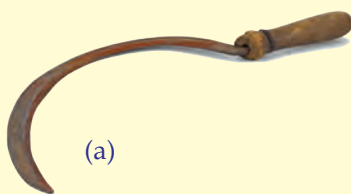


(c)

Harrow: It is used for manual weeding.

Figure 1.6 (a) Trowel, (b) hoe and (c) harrow

TOOLS FOR HARVESTING



(a)

Sickle: It is used for harvesting crops manually.



(b)

Harvester combine: It is used for cutting, threshing and separating grains.



(c)

Winnowing machine: It is used for separating grains and chaff by winnowing.

Figure 1.7 (a) Sickle, (b) harvester combine and (c) winnowing machine

1.4 Basic Steps of Agriculture

The following basic steps are involved in the cultivation of crops.

1. Preparation of soil
2. Sowing
3. Manuring
4. Irrigation
5. Weeding and protection of crops
6. Harvesting
7. Storage

Enquire and Discuss 1.2

Soil preparation and ploughing is important before sowing seeds for growing crops. The process involves loosening of the soil.

- 1 Why does the soil need to be loosened?
- 2 Can you identify the tool and for which purpose it is used?



Figure 1.8

PREPARATION OF SOIL

The preparation of soil is one of the important steps in agriculture. This step involves the process of loosening the soil (ploughing), digging, manuring and levelling. The loosening of soil allows the roots to penetrate deep into the soil and take in air easily. Water, minerals, some small living organisms along with dead organic matter add various nutrients to the soil. Turning and loosening of the soil brings those nutrients to the top so that plants can get these nutrients easily. Ploughing is done by a plough. A plough is drawn by a pair of bulls or other animals such as horses and camels. Ploughs are made of wood or iron. Sometimes manure is added before loosening of soil so that it mixes properly with the soil. After ploughing, the soil is levelled with the help of a **leveller**. Before sowing, the soil is watered. The main part of the plough is a long log of wood which is called plough **shaft**. A triangular strip is attached to the plough shaft called plough **share**. At one end of the shaft there is a handle. The other end is attached to a beam which is placed on the bull's neck. Nowadays, ploughing is done by cultivators driven by tractors. It saves labour and time.



Figure 1.9 Ploughing by bullocks



Figure 1.10 Ploughing by tractors

SOWING

The process of putting seeds into the soil is called sowing. Sowing is also an important step in crop production. Clean and healthy seeds of good quality are required for sowing. Usually farmers prefer high-yielding variety of seeds. State agricultural board and seed corporation are the places to buy good quality seeds.

Activity 1.1

Aim: To separate good and healthy seeds.

Materials required: a bowl, a cup of water and 4 table spoons of green mung bean seeds

Procedure:

1. Put the mung bean seeds in the bowl.
2. Add water into the bowl. Keep it for 5 minutes.

Observation: Are all seeds floating in water?

Conclusion: The seeds which float in water are damaged seeds and the seeds which sink in water are good and healthy seeds.



Figure 1.11

From Activity 1.1, it is confirmed that the lightweight seeds are damaged seeds. They are not fit for sowing. In this way, we can separate good and damaged seeds. Let us discuss how the seeds are sown in fields. There are some ways in which seeds are sown.

Broadcasting: It is a method of sowing seeds by scattering them by hands (Figure 1.12). It is a traditional method that results in unequal distribution of seeds.

Traditional Tools: It is shaped like a funnel (Figure 1.13). The seeds are filled into the funnel at the top which is attached to the plough. Seeds are released into the soil through two or three pipes having sharp ends.

Seed Drills: It is a sowing device which is used with the help of tractors (Figure 1.14). This tool sows the seeds uniformly at proper distances and depth. Nowadays, seed drill is used to save time and labour.



Figure 1.12 Broadcasting



Figure 1.13 Traditional tool for sowing seeds



Figure 1.14 A seed drill attached to a tractor

Enquire and Discuss 1.3

- 1 While sowing seeds a proper distance between seeds is important. Give reason.
- 2 Many times, you would have noticed, some small plants are kept in small bags in a nursery. Can you give the reason of doing this?

MANURING

The process of adding manure and fertilisers to the soil is called manuring.

Do you know what are manures and fertilisers?

Manure: It is an organic substance obtained from the decomposition of plant and animal wastes. They add essential nutrients and **humus** to the soil and make it fertile. Manures are of three types: **farmyard manure**, **compost** and **green manure**.

Farmyard manure consists of cattle dung, straw, leaves and other farmyard wastes.

Compost: It is obtained by the decomposition of dead plant and animal wastes. Farmers dump plant and animal wastes in pits at open places and allow it to decompose. This decomposition is done by microorganisms. Vermicompost is another form of compost you have already learnt. In vermicomposting, the organic waste decomposes faster with the help of earthworms.

Green undecomposed material used as manure is **green manure**. Green manure consists of all types of pulse (leguminous) plants that have high nitrogen content. They are grown in a field and ploughed back into the soil. They help in replenishment of the soil with nitrogen.

Do you know why the leguminous plants have high nitrogen content?

Leguminous plants have nodules on their roots. A type of bacteria called *Rhizobium* live in these nodules. They help in fixing nitrogen.

Humus: organic component of soil, formed by decomposition

Vermicompost: product of composting using worms

Activity 1.2

Aim: To observe nodules on the roots of leguminous (pulse) plants.

Materials required: a trowel, any pulse plant such as peas, gram, beans and mung beans

Procedure:

1. Dig up the plant with roots by using the trowel.
2. Wash off the mud and observe the roots carefully.

Observation: Have you observed the bead-like structure on the roots?

Conclusion: The bead-like structures are called nodules.

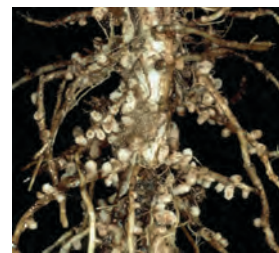


Figure 1.15

Off the Wall

Organic food: The system of farming in which environment-friendly methods are used for the cultivation of crops is called **organic farming**. In this system, no fertilisers, no chemicals and no pesticides are used. The crops are cultivated by using organic manure. Plants such as *tulsi*, *neem*, garlic and marigold are used to repel insect pests. *Neem* oil is used as natural pesticides. The foods obtained through organic farming are called organic food. Organic foods are expensive than normal food.

Advantages of manure:

- It adds organic substances to the soil and enriches the soil.
- It increases water-holding capacity and makes the soil porous for exchange of gases.
- It increases the number of useful microorganisms.
- It maintains the quality of the soil for a long time.

Fertilisers: Fertilisers are chemical substances produced in factories. They are rich in a particular nutrient, for example, urea, ammonium sulphate, potash and NPK (nitrogen, phosphorus and potassium). The use of fertilisers results in better yield of crops, but its excessive use makes the soil less fertile. Fertilisers are unfit for human consumption. They are the source of soil and water pollution. Therefore, they should be used judiciously. To maintain the fertility of the soil, we should substitute fertilisers by organic manure and adopt crop rotation (growing different crops alternately on the same land). Differences between manure and fertiliser are given in Table 1.3.

IRRIGATION

Like us, plants also need water for proper growth and development. Right from the germination of seeds to the maturity, water plays an important role in the life of plants.

The process of supplying water to crop plants at different intervals is called irrigation.

Ponds, lakes, rivers, dams, canals, wells and tube wells are the sources of irrigation.

Table 1.3 Manure vs. Fertiliser

Manure	Fertiliser
Manures are natural organic substances obtained by decomposition of plant and animal wastes.	Fertilisers are inorganic chemical substances.
They contain all essential nutrients required for plants.	They are rich in a particular nutrient such as nitrogen, potassium and phosphorus.
They are prepared in the fields.	They are produced in factories.
They provide humus to the soil.	They do not provide any humus to the soil.
They take long time to show results.	They show immediate results.
They are safe and eco-friendly.	They pollute environment.

Enquire and Discuss 1.4

- 1 Water requirement is more in the summer season. Why?
- 2 Rice plants need continuous irrigation. Why?

In the summer season, the water requirement is higher than in the other seasons. Similarly, some crops need more water than others, and sandy soil needs frequent watering. Therefore, the time and frequency of irrigation vary from crop to crop, soil to soil and season to season.

Traditional Methods of Irrigation: In our country, the various traditional ways of irrigation are (1) moat, (2) chain pump, (3) *dhekli* and (4) *rahat*. These different methods are used to lift water from different sources and supply it to the fields. As these methods are cheaper, they are less efficient.

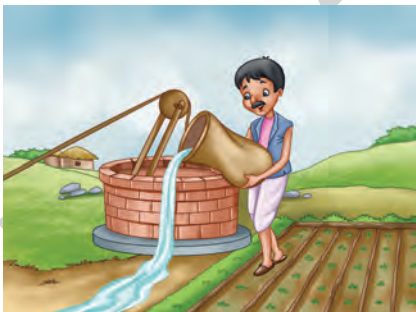


Figure 1.16

Pulley system (moat): It involves pulling water from a well or other water sources to water crops. It is a time-consuming process and not efficient.

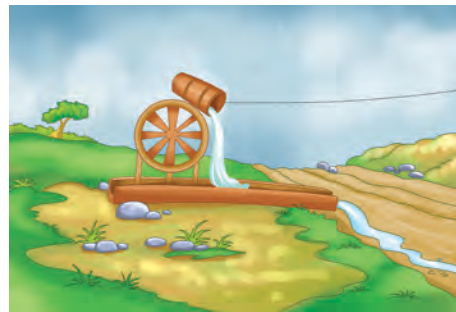


Figure 1.17

Chain pump: It uses a round metal disc, attached to a long loop of metal chain that runs through a pool of water. When the metal chain is pulled, the metal disc rises up and the water inside pours out.



Figure 1.18

Dhekli: In this system, a person has to take out water through a bucket and pour it into the field.



Figure 1.19

Lever system (rahat): In this system, animals such as oxen and bullocks are used to pull out water from the wells.

Modern Methods of Irrigation: Nowadays, pumps are commonly used to lift water to a height. Diesel, electricity and solar energy are used to run these pumps. Sprinklers and drip systems are modern methods of irrigation that help in economic use of water. These systems are costly but are more efficient.



Figure 1.20 Sprinkler system

Sprinkler system: In this system, many pipes having rotating nozzles are joined to the main pipe at regular intervals. Water is sprinkled from the nozzles as rain. It is a very useful and efficient system nowadays.



Figure 1.21 Drip system

Drip system: This system provides water to the plants drop by drop. It is the best technique for vegetable crops and garden plants. In this system, there is no water wastage. This system can be used in dry areas where availability of water is poor.

WEEDING AND PROTECTION OF CROPS

Weeding: Do you know what weeds are and what weeding is?

Weeds are some unwanted plants which grow along with the crops. They are undesirable, and they compete with crop plants for light, nutrients, water, air and space. They affect the growth of the crops which results in poor crop yield. So removal of weeds is necessary for growing healthy and high-yielding crops. The removal of weeds is called **weeding**. The best time for weeding is before flowering and seed formation. Grass, *Amaranthus* and *Chenopodium* are common weeds which grow with crops. Weeds can be removed by **manual weeding** or **by using some weedicides**.

Manual Weeding: Weeds are removed manually by uprooting them or cutting them close with the ground. It is done with the help of a *khurpa* or a harrow. Sometimes seed drill is also used to uproot weeds.

By Using Weedicides: The chemical substances that kill and destroy weeds but do not harm the crops are called weedicides. These weedicides are chemicals. They are diluted with water and sprayed in the field with a **sprayer** during early growth of weeds. Farmers should cover their nose and mouth while spraying these chemicals to protect themselves.

Protection of Crops from Pests: The organisms that damage and attack crop plants are called **pests**. They may be insects, small animals or birds. Some chemical substances are used to kill such organisms for the protection of crops. These chemicals are called **pesticides**. The pesticides are also sprayed with a sprayer to protect crops.



Figure 1.22 Manual weeding with *khurpa*



Figure 1.23 Weeding through sprayer

Activity 1.3

- Visit a shop which deals with weedicides and pesticides. Find out the names of weedicides and pesticides sold by the shopkeeper. You can also enquire about the weeds and pests against which they are effective. Get the answers and keep a record of these data in your file.

Threshing: process of separating grains from stalk

Winnowing: process of separating grains from chaff

Off the Wall

The harvesting period brings lots of excitement and happiness all over India. After few months of hard work, farmers enjoy the sense of joy and relaxation getting the fruits of their hard work. Men and women, all celebrate this season with a great interest and excitement. Baisakhi, Holi, Pongal, Diwali, Nabanya and Bihu are some of the harvest festivals celebrated in India.

Silo: a tall tower or pit on a farm used to store grains

Granaries: a storehouse for threshed grains

HARVESTING

Harvesting: The process of cutting of crops after it is matured is called harvesting. During harvesting, crops are pulled out or cut close to the ground. Harvesting in our country is done by a sickle or by a machine called harvester.

Threshing: The process of separating grains from the harvested stalks is known as threshing. This is done by spreading the harvested crops on the ground and walking over them. For this purpose, animals such as bullocks, buffaloes or camels are used. Nowadays, this process is carried out with the help of a machine called combine, which can be used for both harvesting and threshing.

Winnowing: The process of separating grains from chaff (the dry, scaly, lighter parts of chopped straw and flowers) is known as winnowing. The wind blows away lighter chaff from the mixture and heavier grains left. Big farms use winnowing machine for the separation of grains from chaff.



Figure 1.24 Threshing by bullocks



Figure 1.25 Winnowing

STORAGE

Proper storage of grains is important if they are to be kept for a long time. There are two different modes of storage: dry storage and cold storage.

Dry Storage: Fresh crops have moisture. If fresh grains are stored without drying, they may get spoilt or attacked by organisms. So, before storing them, they should be properly dried in the sun to bring down the moisture content. The dried grains are weighed and packed in gunny bags and transferred to godowns or granaries. On a large scale, storage of grains is done in silos.

A new method of grain storage involves the use of nitrogen gas. It is circulated throughout silos; as a result, it replaces air



Figure 1.26 Storage of grains in godowns



Figure 1.27 Silos for storage of grains



Figure 1.28 Cold storage with food

(oxygen) and kills microbes. This method is simple and easy to implement for storing grains for a long time.

Cold Storage: This method is used mostly for some vegetables, fruits and flowers. They have very high moisture content. They are stored at low temperature in cold storage.

1.5 Food from Animals

Like plants, animals also give us different types of food. A number of domestic animals such as cows, goats, ducks, hens, fish and honeybees provide us with foods. The keeping of such animals for specific purposes is called **domestication**. This is also called **rearing** of animals. The domesticated animals constitute **livestock**. The breeding, feeding and caring of such animals on a large scale for food and other useful purposes is called **animal husbandry**.

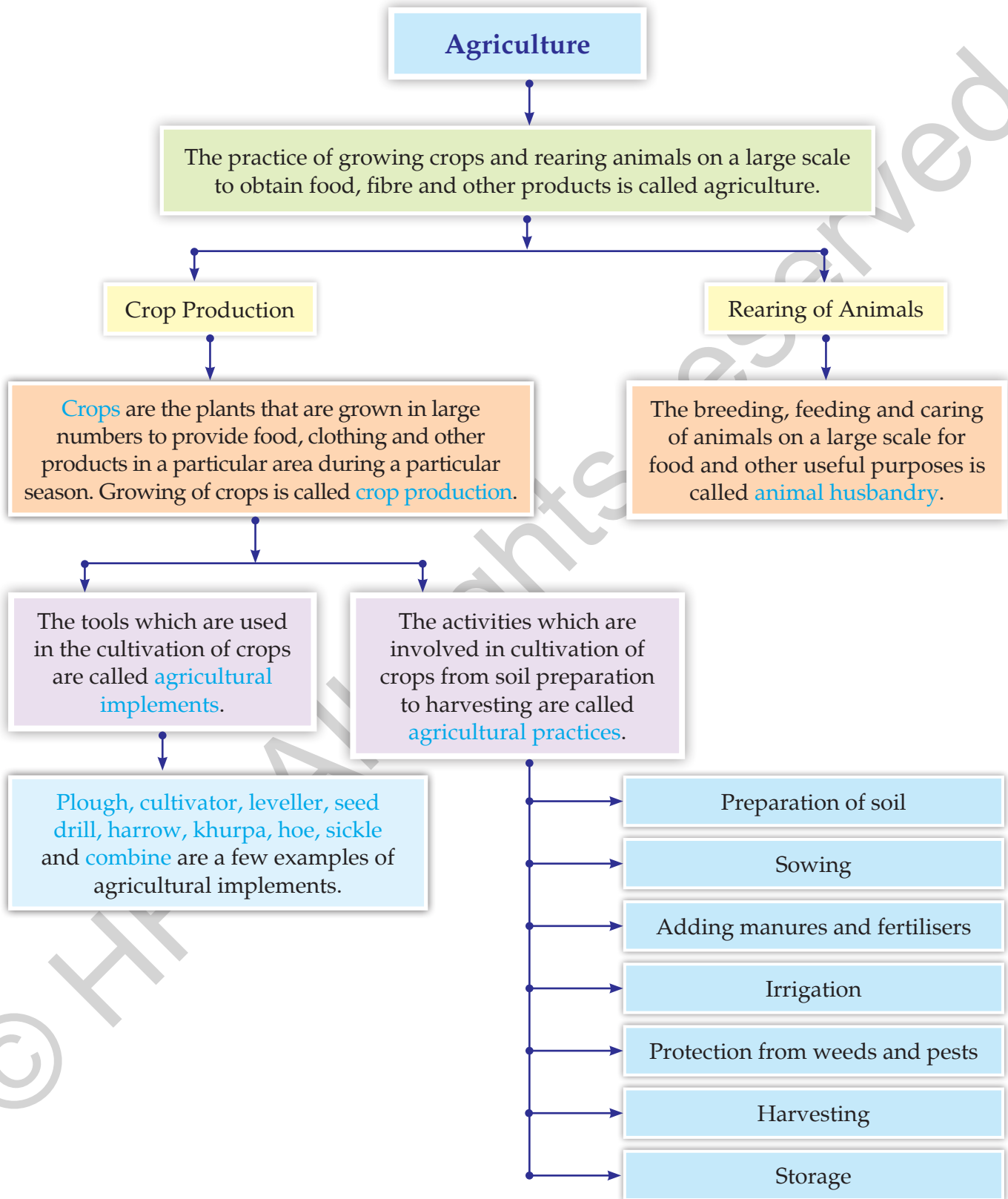
Activity 1.4

Aim: To know the sources (names of animals) of food.

Procedure: Write the name of food and its source (specify the name/names of animals) in the table below.

	Name of food	Sources (animals)
1.	Meat	
2.	Milk	
3.		
4.		
5.		

Concept FLOW





Check Your Knowledge

1. Fill in the blanks.

- (a) Paddy and maize are _____ crops on the basis of their growing season.
- (b) Mixing of soil with manure is called _____.
- (c) The same kind of plants grown on a large scale at a place is called _____.
- (d) The unwanted plants that grow along with the crops are called _____.
- (e) _____ is the process of separating grains from the harvested stalks.

2. Write T for the true and F for the false statements.

- (a) A hoe is a tool used for removing weeds and for loosening the soil.
- (b) A cultivator driven by a tractor is used for harvesting and threshing.
- (c) Fertilisers are organic chemical substances produced in factories.
- (d) Separation of grains from chaff is called winnowing.
- (e) Lever system (*rahat*) is a very useful and efficient system for irrigation nowadays.

3. Give one word for the following:

- (a) the process of digging and loosening of the soil
- (b) the crops which are grown in the winter season
- (c) the process of supplying water to the crops at different intervals
- (d) the organic substance obtained from the decomposition of plant and animal wastes
- (e) an agricultural practice used to sow seeds

4. Give two examples of each.

- (a) Summer crops (b) Kharif crops (c) Rabi crops

5. Write a short note in your own words on each of the following.

- (a) Ploughing (b) Weeding (c) Irrigation
- (d) Harvesting (e) Animal husbandry

6. Give use of each of the following.

- (a) Sickle (b) Harrow (c) Combine
- (d) Silos (e) Leveller

7. Explain the difference between
 - (a) manures and fertilisers.
 - (b) cultivator and combine.
 - (c) sprinkler system and drip system.
8. List the points that should be kept in mind while sowing seeds in a field.
9. How do we protect crops from pests and diseases?
10. Mention the differences between dry and cold storages.
11. Discuss briefly the traditional methods of irrigation. How the modern methods help us to conserve water?

Think and Apply

1. Tick the correct option.
 - (a) Which of the following tools is not used for weeding?
 - (i) Harrow
 - (ii) Hoe
 - (iii) Trowel
 - (iv) Sickle
 - (b) Nowadays, seeds are sown in the field by using
 - (i) seed tractor.
 - (ii) seed drill.
 - (iii) seed plough.
 - (iv) cultivator.
 - (c) Before sowing the seeds, it is necessary to break the soil for better yield. The tools used for this purpose are
 - (i) ploughs, seed drills and hoes.
 - (ii) ploughs, hoes and cultivators.
 - (iii) ploughs, seed drills and combines.
 - (iv) ploughs, sickles and levellers.
 - (d) A combine is a combination of
 - (i) seed drill and thresher.
 - (ii) harvester and sprayer.
 - (iii) harvester and thresher.
 - (iv) plough and harvester.
 - (e) Which of the following statements is **false** about fertiliser?
 - (i) It is produced in factories.
 - (ii) It pollutes the environment.
 - (iii) It provides humus to the soil.
 - (iv) It is an inorganic chemical substance.
2. Give reason.
 - (a) Soil gets affected by continuous plantation of the same crops.
 - (b) Land is levelled before sowing.
 - (c) Selection of seeds is important before sowing.
3. We are always advised to wash fruits properly before eating them. Write the reason.

Analyse

1. Observe Figure 1.29.
Can you guess what the farmer is doing?
What is the process called?
Do all crops need this process?
Give one example of the crop for which this process is applied.



Figure 1.29

2. Drip irrigation supplies water directly to the roots by dropping system. It saves wastage of water. But why is drip irrigation not used by all farmers? Analyse and write your comments for it.

Think Beyond

1. Ploughing in the field is generally done in dry season. Why?
2. What will happen if we keep on growing crop after crop without using manures and fertilisers?

Values to Learn

Mohan is a farmer residing in a village near Faridabad. He wants to grow crops for the coming season. He visits a fertiliser shop with his son Manu to buy fertilisers. The salesman asked about the crops Mohan wants to grow and suggested nitrogenous fertilisers. Suddenly his son Manu intervened that for our crops, nitrogenous fertilisers are not required. He stopped his father from buying those fertilisers.

- (a) What values are shown by Manu?
- (b) Can you say what the crops are that Mohan wants to grow?
- (c) What is the reason of Manu's suggestion?

Create and Learn **FA**

1. Visit any cold storage. Find out what food products are stored in it. Gather information about the temperature at which the products are kept, how long the products remain fresh and what the charges are for storing them.
2. Collect some seeds and identify them. Classify the seeds on the basis of their use. Paste those seeds on a drawing sheet and label them.

Teacher's Corner

Help students visit any agricultural farm or institute. Help them understand and gather information about the implements and the activities.



2

Microbes: Good and Bad



We will Explore

- | | |
|--------------------------------|-----------------------|
| 2.1 Microbes | 2.4 Harmful microbes |
| 2.2 Classification of microbes | 2.5 Food preservation |
| 2.3 Useful microbes | 2.6 Nitrogen fixation |

Did you ever keep any fresh food such as meat, fish, fruits and other vegetables on the kitchen shelf for a long time?

If you have never done that, let us do a small experiment. Just leave some fruits and vegetables on the kitchen shelf for about six to seven days, and observe what happens to them. After six or seven days, you will see that their appearance and smell have changed. Some of them would be covered with a whitish substance and others would be covered with some orange powdery substance. Also, most of them would have foul smell. All these signs indicate that these foods are spoiled.



Figure 2.1 Spoiled food

Food spoilage is caused by two main factors: natural decay and contamination by microbes.

Do you know any microbe that contaminates food?

The main microbes or microorganisms responsible for the contamination of food are bacteria, moulds and yeasts. These microbes are invisible to the naked eye but can be seen under a microscope. Let us discuss more about microbes.

2.1 Microbes

Microbes are living organisms around us which cannot be seen with naked eyes. They are found everywhere, in air, water and soil. These microbes are so small in size that they can only be seen through a magnifying glass or a microscope. So they are called microbes or microorganisms.

Activity 2.1

Aim: To find out some microbes in water.

Materials required: a glass slide, a microscope or a magnifying glass

Procedure:

1. Take few drops of water from any pool or pond.
2. Spread the water on the glass slide and observe through the microscope.

Observation: Do you find very small organisms moving around?

In Activity 2.1, most of the tiny organisms are coming under microbes.

2.2 Classification of Microbes

Microbes are classified or grouped in various ways. The major groups of microbes are **bacteria**, **protozoa**, **some fungi** and **some algae**.

BACTERIA

Bacteria are present everywhere. They are found even inside and outside of our body. They are made of only one cell. Some bacteria need oxygen for respiration; they are called **aerobic** bacteria. Some others do not need oxygen; they are called **anaerobic** bacteria. On the basis of their shape and size, they are categorised into different types such as rod shaped (*Bacillus*), spherical shaped (*Cocci*), spiral shaped (*Spirilla*) and coma shaped (*Vibrio*).

Bacteria multiply rapidly by the process of fission.

PROTOZOA

Like bacteria, they are also mostly single-celled or unicellular organisms. *Amoeba*, *Paramecium* and *Euglena* are few examples of protozoans. *Euglena* shows the features of both plants and animals. Like bacteria, they also multiply by the process of fission.

FUNGI

Fungi is a special group. Earlier it was called non-green plants, but this group has some specific characters different from both plants and animals. Yeasts, moulds and mushrooms are examples of fungi. All fungi are not microscopic. Bread moulds, *Aspergillus*, *Neurospora* and *Penicillium* are some microfungi.

ALGAE

Algae are very tiny plants; they mostly live in water. They are simplest plants and possess chlorophyll. Some algae are microscopic, whereas others can be seen through naked eyes. Similarly some algae are unicellular, such as *Chlorella* and *Chlamydomonas*, whereas some others are multicellular, such as *Spirogyra*.

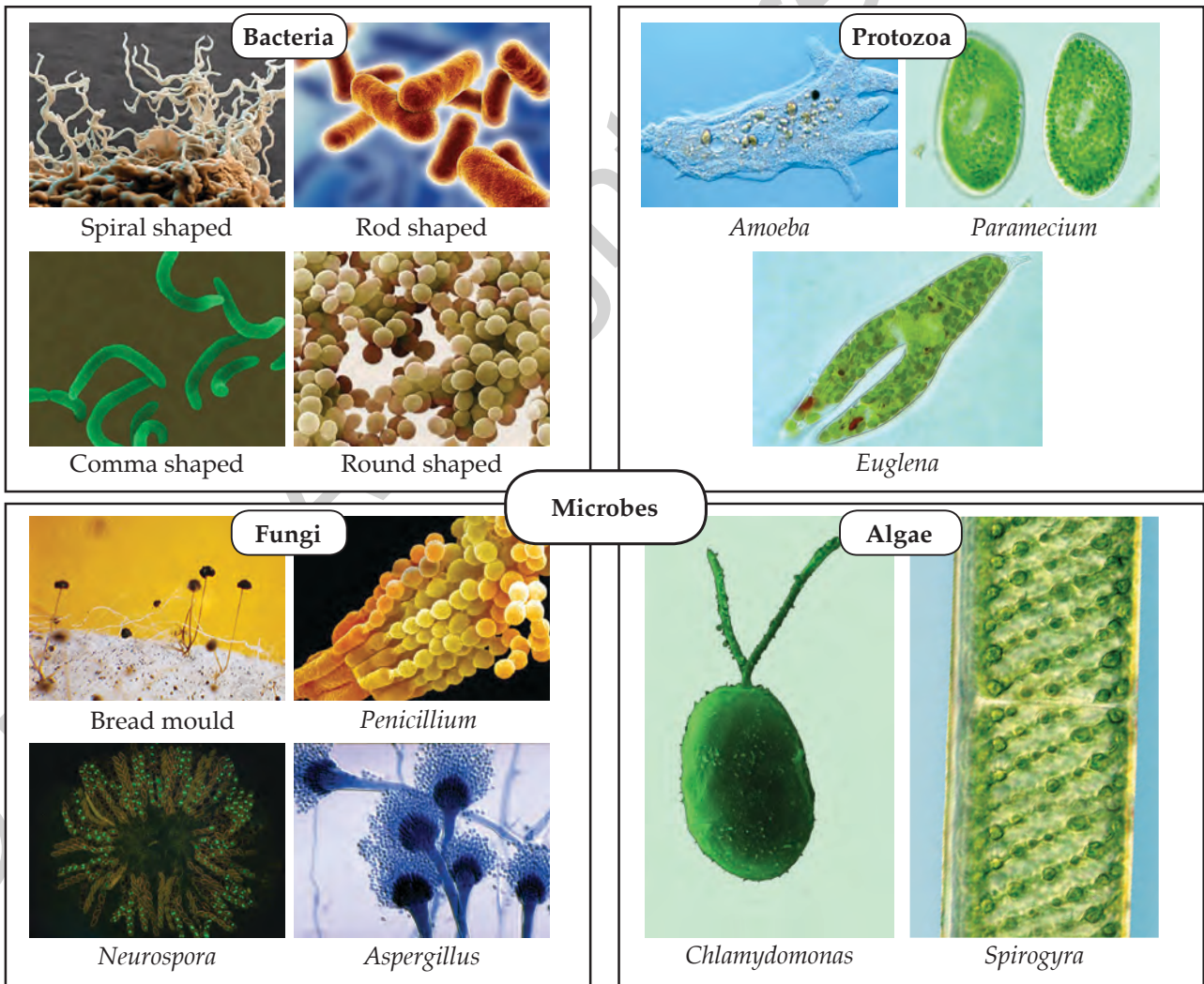


Figure 2.2 Microbes

Viruses: The Living Entity

Have you ever suffered from viral fever, measles or chickenpox? These diseases are caused by viruses. Viruses are also microscopic. They are neither living nor non-living. Therefore they are kept on the borderline between living and non-living things. They are fifty times smaller than bacteria. They become active and reproduce when they are inside a living organism, which may be a bacterium, a plant or an animal. However, they behave like non-living things outside living cells. They are **parasitic** in nature. They cause diseases in humans, plants and animals. Serious diseases such as polio, chickenpox, cancer and AIDS are caused by virus.

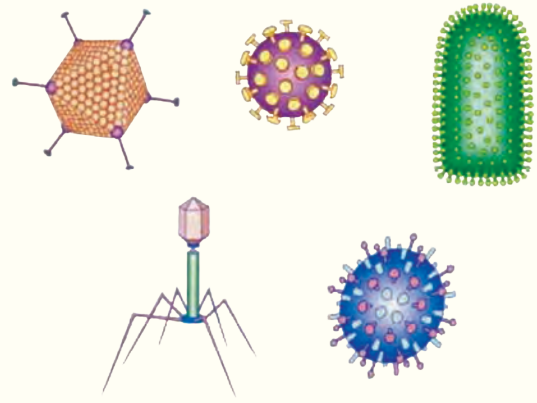


Figure 2.3 Types of viruses

Science Diaries

Antonie van Leeuwenhoek is known as the first microbiologist. He is also known for his work on microscope. He was the first to observe bacteria, free-living and parasitic microscopic protists, sperm cells and the blood cells. He is commonly known as the father of microbiology.



Figure 2.4

Microbes play an important role in our lives. Some of them are very useful to us, whereas some others are harmful and cause diseases. Let us study about both useful and harmful microbes in detail.

2.3 Useful Microbes

Microbes are useful in various ways. They are used in

- food and beverage industry,
- pharmaceutical industry,
- agriculture and
- cleaning our environment.

FOOD AND BEVERAGE INDUSTRY

Making Yogurt, Cheese and Other Foods: We have learnt from our previous class that curd or yogurt is made by bacteria. It contains several microbes, but a bacterium named *Lactobacillus* converts milk into yogurt. Industrially, yogurt is made by adding *Lactobacillus* bacteria to milk. Bacteria are also involved in making cheese and other foods such as butter milk, cottage cheese, sour cream and cultured butter.

Making Bread, Pastries and Cake: Fungi and yeasts play an important role in making these foods. Through yeast fermentation, carbon dioxide gas is released which makes the dough spongy and increases its volume. This is the basis of the use of yeast in the baking industry.

Activity 2.2

Aim: To observe the effect of yeast while making a cake.

Materials required: yeast powder/baking powder, a cup of white flour, water and sugar

Procedure:

1. Add sugar to white flour, and mix them properly.
2. Add one teaspoonful of baking powder/yeast powder, and knead to make dough by using warm water.
3. Keep it for 3 hours.

Observation: Do you find the dough rising?

Making Idlis, Dosas and Bhature: We make idlis and dosas from the mixture of dal and rice. The mixture is allowed to stand for few hours, and the fermentation occurs naturally because of bacterial action. For making *rawa/suji idlis* and *bhature*, curd is added to make them fluffy and soft.

Enquire and Discuss 2.1

Have you ever eaten dhokla? It is a popular food item in Gujarat. Eating dhokla is good for our health. It is made with gram flour. Do you know how it is prepared?

Making Beverages: Yeast is used in the production of alcohol and wine. Yeast is grown on natural sugars present in the grains such as barley, wheat, rice and crushed fruit juices. Through fermentation process, wine is prepared. For other beverages such as tea, coffee and cocoa, bacteria are also used.

PHARMACEUTICAL INDUSTRY

Making Medicines: All of us know about antibiotic tablets. Certain bacteria and fungi are used to make **antibiotics**. These medicines kill or stop the growth of the disease-causing microorganisms. **Penicillin** is a common and first antibiotic



Antibiotics are medicines that are used to treat infections caused by germs such as bacteria and certain parasites. They can be taken in the form of liquids, tablets or capsules or can be administered by injections. Antibiotics do not work against viral infections such as cold, flu, cough, bronchitis, sore throat or fungal infections of skin. It is important to remember that antibiotics should be taken only on the advice of a qualified doctor. While taking antibiotics, follow the directions carefully. It is important to finish your medicine course even if you feel better. If you stop treatment too soon, some bacteria may survive and re-infect you. Do not save antibiotics for later or use someone else's prescription. Unnecessarily taking antibiotics may kill the beneficial bacteria in the body.



Figure 2.5

Science Diaries

Sir Alexander Fleming was a Scottish biologist, a doctor and a botanist. He is most popular for his discovery of antibiotic **penicillin** for which he was awarded Nobel Prize in 1945.



Figure 2.6

prepared from fungi **Penicillium**. Streptomycin, tetracycline and erythromycin are some of the other common antibiotics. Antibiotics are also used to control many plant and animal diseases.

Making Vaccines: Do you know what vaccines are? In your childhood, you would have been given vaccines to protect yourself against some diseases. When the vaccines are injected into the body of a patient, the body produces **antibodies** to fight them. The antibodies remain in the body, and we are protected from the future attack of disease-causing microbes. Diseases such as measles, smallpox, chickenpox, polio, mumps and tuberculosis can be prevented by vaccination.

The disease smallpox is now eradicated from most part of the world. Polio drop is given to protect children under Pulse Polio programme. Nowadays, vaccines are made on a large scale.

Antibodies: proteins that are secreted in body against pathogens

AGRICULTURE

Increasing Soil Fertility: Microorganisms such as bacteria and fungi decompose dead organic wastes of plants and animals and convert them into simple substances. The

Activity 2.3

Aim: To observe microbial decomposition.

Procedure:

1. Collect some vegetable and fruit wastes from your house and some fallen leaves and wastes from the garden.
2. Collect some empty small glass bottles, polythene bags and broken plastic toys or bottles.
3. Make two big holes in the ground and mark them as X and Y.
4. Put all vegetable and fruit wastes in pit X and polythene bags, plastic and glass items in pit Y.

Observation: Observe them after one month. Have you observed any difference between the two pits?

Conclusion: Decomposition occurs in pit X, and there is no change in the waste in pit Y.

products obtained after decomposition escape into the air and soil. The soil thus is enriched with humus and becomes fertile.

From Activity 2.3, we concluded that through decomposition, plant wastes have been converted to manure by the action of microbes. However, there is no microbial activity on plastic and glass items.

Nitrogen Fixation: Some bacteria and blue-green algae are able to fix nitrogen from the atmosphere in the soil which makes the soil rich in nitrogen and increases its fertility. These microbes are called **biological nitrogen fixers**. We will learn in detail about nitrogen fixation later.

CLEANING THE ENVIRONMENT

Microbes such as fungi and bacteria help in decomposing the dead and waste materials into simple substances. Thus, they help in cleaning our environment. Some bacteria decompose sewage and other wastes and thus help keeping the environment free from pollution. Most of

the oxygen is produced through photosynthesis by algae in oceans.

2.4 Harmful Microbes

Microbes are harmful in many ways. Disease-causing microbes are called germs or **pathogens**. Some microorganisms also spoil food, clothes and leather.



Figure 2.7: Anopheles mosquito



Figure 2.8: Housefly

CAUSING DISEASES IN HUMAN BEINGS, PLANTS AND ANIMALS

Diseases in Humans: Germs enter our body through air, water and food or through direct contact with an infected person. Thus microbial diseases that can spread from an infected person to a healthy person through water, air or physical contact are called **communicable diseases**. In Table 2.1, some common human diseases, disease-causing microbes and their mode of transmission are given. Some insects and animals also act as **carriers** of disease-causing microbes. Female *Anopheles* mosquito carries the malaria germs. When it bites a healthy person, the person gets infected with malaria. In the same way, female *Aedes* mosquito acts as a carrier of the dengue virus. Houseflies also act as a carrier of germs. When

Table 2.1 Human diseases, microbes and mode of transmission

Diseases	Microbes	Mode of Transmission
Common cold	Virus	Air
Measles	Virus	Air
Chickenpox	Virus	Air/contact
Typhoid	Bacteria	Food and water
Cholera	Bacteria	Water
Tuberculosis	Bacteria	Air
Diarrhoea	Bacteria	Water
Malaria	Protozoa	Mosquito
Amoebic dysentery	Protozoa	Food and water

Carriers: a person or thing that carries infectious disease agent

Enquire and Discuss 2.2

Communicable diseases spread through food, water, air or physical contact. Discuss how you can prevent spreading of such diseases and what you should do to prevent mosquito-borne diseases such as malaria and dengue.

they sit on garbage and dirt, germs stick to their bodies. When they sit on our food, germs are transferred to the food. So, we should avoid consuming uncovered food.

Diseases in Plants: Some microbes cause diseases in plants such as wheat, barley, rice, potatoes and sugar cane. These diseases cause reducing yield of crops. Certain chemicals are used to kill such microbes for controlling the diseases.

Diseases in Animals: Microbes also cause diseases in animals. Anthrax is a dangerous cattle disease caused by bacteria. Some plant and animal diseases and disease-causing microbes are given in Table 2.2.

Table 2.2 Plant and animal diseases caused by microbes

Plant Diseases	Microbes	Animal Diseases	Microbes
Citrus canker	Bacteria	Foot and mouth disease in cattle	Virus
Rust of wheat	Fungi	Anthrax disease in animals	Bacteria
Red rot of sugar cane	Fungi	Botulism	Bacteria
Yellow vein mosaic disease in okra (<i>bhindi</i>)	Virus	Rabies	Virus
Tobacco mosaic disease	Virus	Brucellosis in cattle	Bacteria

Science Diaries

Robert Koch is known as the father of modern bacteriology. He is famous for his role in identifying causative microbes for the diseases such as tuberculosis, cholera and anthrax. He created and improved laboratory technologies and techniques in the field of microbiology. His research led to the creation of **Koch's postulates**.

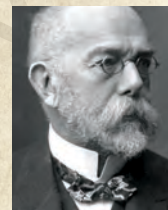


Figure 2.9

POISONING OF FOOD

Food poisoning occurs because of the consumption of spoiled food. Mostly bacteria and fungi are responsible for the spoilage of food. These microbes grow on the food and

produce toxic substances. Thus, consuming these foods makes us ill. Foods such as fruits, jellies, jams and pickles are spoiled by **yeasts and moulds**. Souring of milk, rotting of potatoes and vegetables and contamination of meat and fish are caused by **bacteria**.

Enquire and Discuss 2.3

Mostly bacteria and fungi are responsible for the spoilage of food. Is spoiling of food a chemical reaction?

Therefore, it is very important to preserve our food properly and prevent them from getting spoilt. How do we preserve food? Let us discuss some common methods to preserve food in our homes.

2.5 Food Preservation

Food preservation is the process of treating and handling foods to stop or slow down food spoilage (loss of quality, edibility or nutritional value) and thus allow longer food storage. Following are some common methods of food preservation.

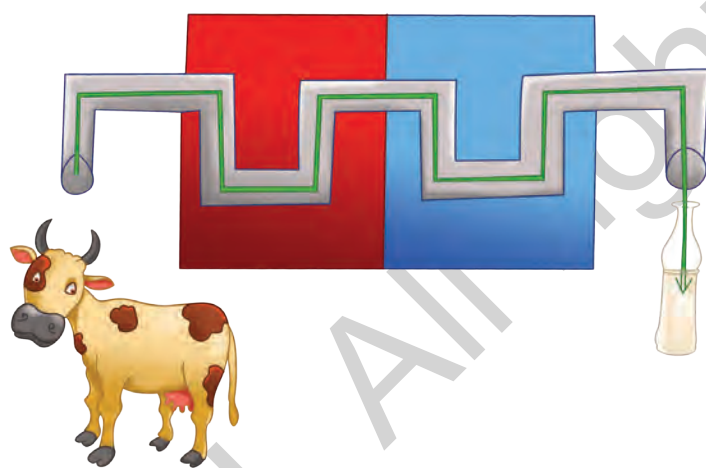


Figure 2.10 Process of pasteurisation

HEATING AND PASTEURISATION

Food at high temperature kills microbes. We boil milk and water to kill microbes. Ultra heat treatment (UHT) is done for partial sterilisation of milk by heating it for a short time at 140°C . It is the modern way of pasteurisation. **UHT** tetrapack milk available in market has shelf life of six months.

Pasteurised milk can be taken without boiling as it is free from microbes. Traditionally ordinary milk is pasteurised in which milk is heated up to 70°C for about half minute and then cooled quickly and stored. This process of pasteurisation was discovered by **Louis Pasteur**. Heating and cooling time and temperatures vary according to the type of pasteurisation process being used.

COOLING

Cooling or keeping food at low temperature in a refrigerator inhibits the growth of microbes. Cooling stops growth and reproduction of microbes and hence preserves food. A refrigerator keeps food at 5°C, whereas a deep freezer keeps food at -18°C. Thus growth of bacteria is prevented.

DRYING OR DEHYDRATION

Drying or removing water or moisture content from food is a method of preservation. Cereals, pulses and some dry fruits are dried and stored, as microbes cannot grow without water.

CANNING

Canning is a method of preserving food in which the food contents are processed and sealed in an airtight container. Nowadays, many canned foods are available in the market.

CHEMICAL METHODS OF PRESERVATION

Some chemicals are also used to check the growth of microbes. They are called **preservatives**. Sodium benzoate and sodium metabisulphite are used as preservatives to control growth of microbes. They are used in jams, sauces and squashes. Some common chemicals such as **salt**, **sugar**, **oil** and **vinegar** are also used for the preservation of food.

Salt is used to preserve meat, fish, pickles and chips. Microbes on salted foods lose water through osmosis. Thus the growth of microbes is inhibited.

Similarly, sugar reduces the moisture content of foods which inhibits the growth of microbes. Jams, jellies and squashes are preserved by adding sugar.

The use of oil and vinegar prevents growth of bacteria. Vegetables, fruits, fishes and pickles are often preserved by this method.



Figure 2.11 Dried cereals



Figure 2.12 Dried pulses

2.6 Nitrogen Fixation

Earlier, we have studied about the bacterium *Rhizobium*. Can you say where do they live and how do they help?

Rhizobium lives in the root nodules of leguminous plants and helps in fixing atmospheric nitrogen. The bacterium and the roots of leguminous plants have a **symbiotic** relationship. Roots of legume plants provide food and shelter for the bacterium, and the bacterium in return provides nitrogen to the plants.

Symbiotic: interdependent relationship in which both the organisms derive benefit

Some other kinds of bacteria also help in fixing nitrogen. Sometimes through lightning, nitrogen is also fixed. After nitrogen is fixed, it can be absorbed and used by the plants and subsequently by animals and later returned to the atmosphere. Thus the amount of nitrogen remains constant. Let us discuss the cyclic process of nitrogen, which is called the nitrogen cycle.

NITROGEN CYCLE

Nitrogen is an essential component of all living organisms, such as **proteins, nucleic acids, chlorophyll** and **vitamins**. Although the percentage of nitrogen in atmosphere is more, it cannot be utilised directly by plants or animals.

Steps involved in nitrogen cycle

- **Nitrogen Fixation:** The atmospheric nitrogen is fixed into nitrogen compounds such as nitrates by lightning and by biological nitrogen fixation through nitrogen-fixing bacteria.
- **Nitrogen Assimilation:** The plants absorb nitrate compounds from the soil and convert them into plant proteins. As plants are eaten up by animals, plant proteins are used to make animal proteins. This process of converting inorganic compounds of nitrogen into organic compounds is called nitrogen assimilation.
- **Ammonification:** When plants and animals die, their remains are converted into ammonia and ammonia

compounds. Bacteria and fungi decompose these complex proteins into ammonia. This process is called **ammonification**.

- **Nitrification:** Ammonia thus formed is converted to nitrites and nitrates by the action of some bacteria. This process is called nitrification. These nitrates are again absorbed by plants, and the cycle is repeated.
- **Denitrification:** Certain denitrifying bacteria convert nitrate form of nitrogen into gaseous form which goes back into the atmosphere. This is called denitrification.

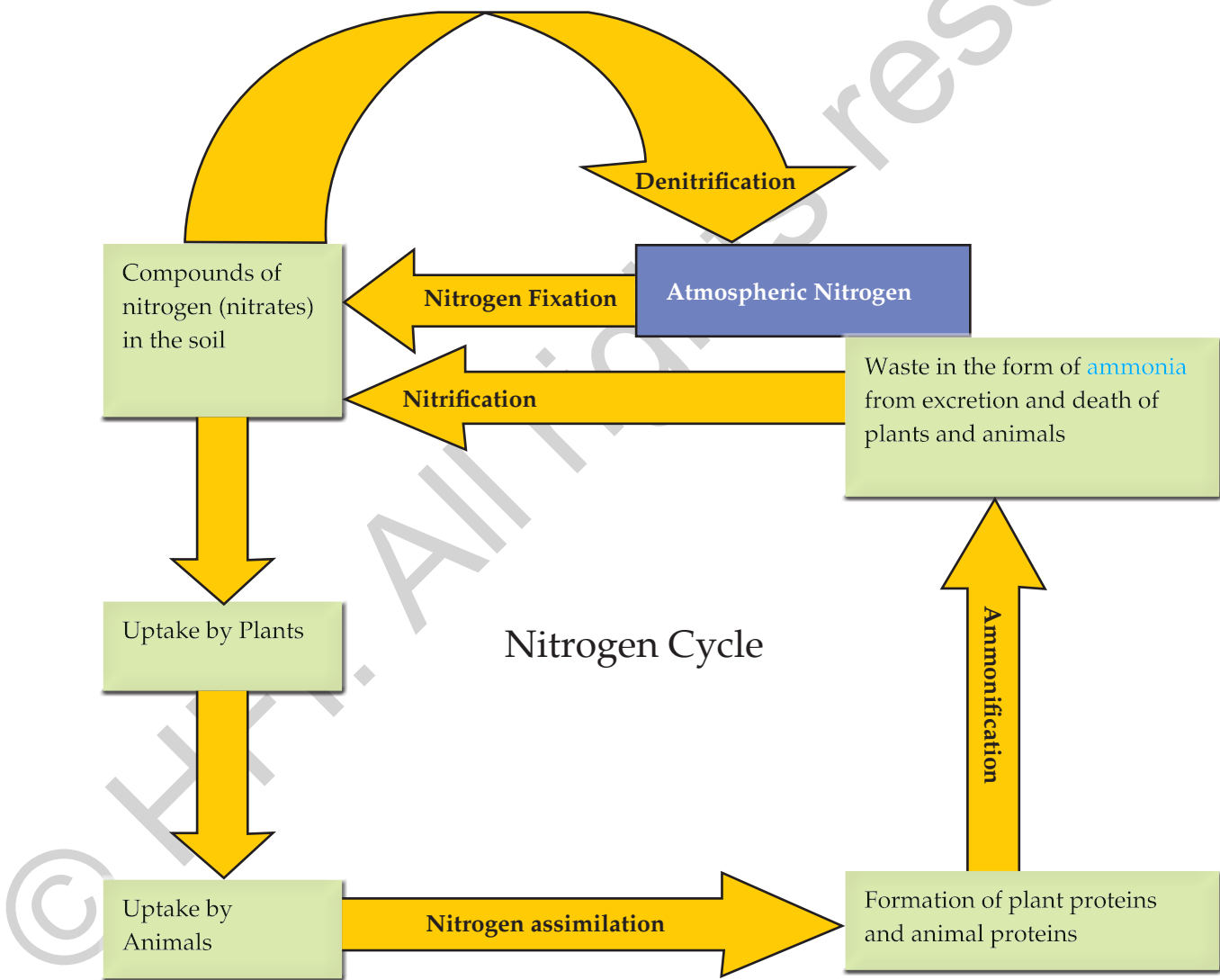
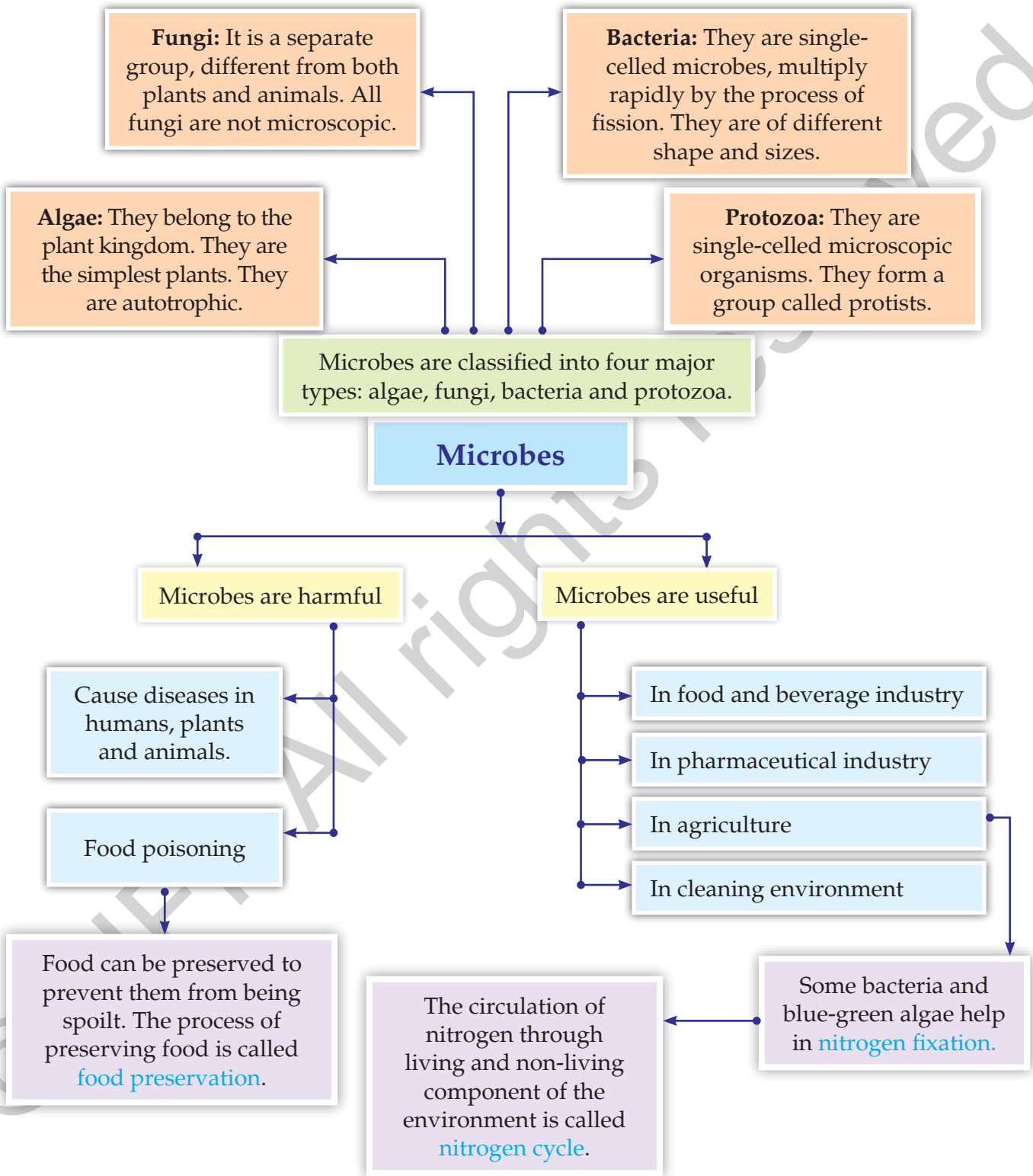


Figure 2.13 Nitrogen cycle

Concept FLOW





Check Your Knowledge

1. Fill in the blanks.

- (a) ____ ____ algae fix nitrogen directly from air to enhance fertility of soil.
- (b) Milk can be preserved by _____.
- (c) Cholera is caused by _____.
- (d) _____ mosquito causes dengue disease in humans.
- (e) ____ is used in the process of fermentation.

2. Write T for the true statements and F for the false statements.

- (a) Anthrax is a bacterial disease.
- (b) The antibiotic penicillin is obtained from algae.
- (c) The method of preserving food by adding salt is canning.
- (d) The process of converting ammonia into nitrate is called ammonification.
- (e) Algae can make their own food.

3. Give one word for the following:

- (a) rod-shaped bacteria
- (b) the simplest microscopic tiny plants
- (c) the medicines that kill or stop growth of disease-causing bacteria
- (d) the conversion of nitrate form of nitrogen into gaseous form of nitrogen
- (e) the disease caused by Anopheles mosquito

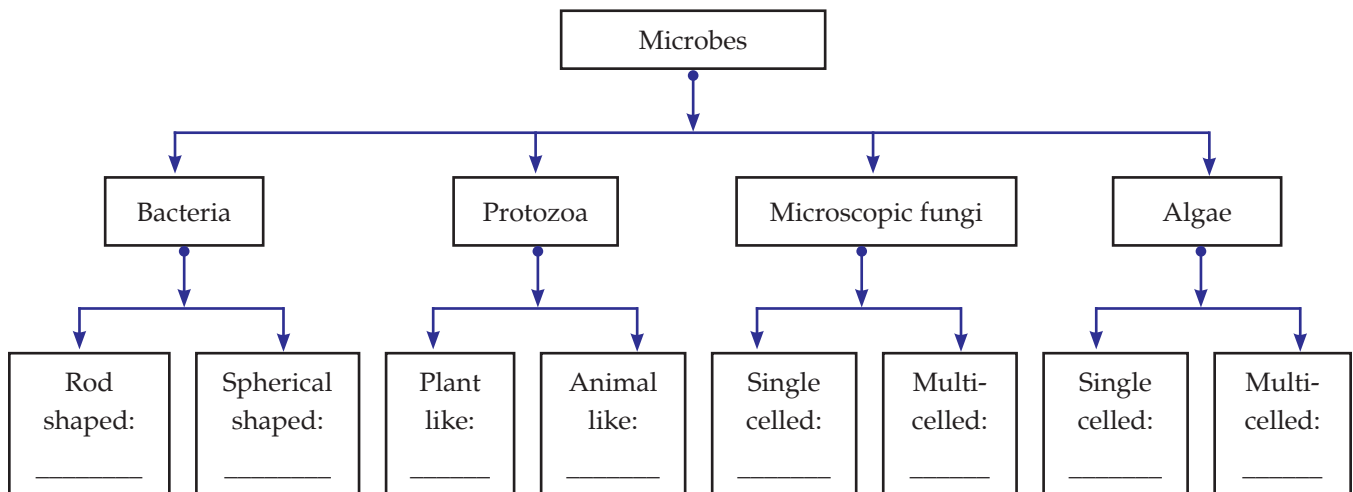
4. Match the columns.

A	B
<i>Lactobacillus</i>	Causing AIDS
Virus	Baking of bread
Yeast	Fixing nitrogen
Bacteria	Causing cholera
<i>Rhizobium</i>	Setting of curd

5. Give two examples of each.

- (a) Viral diseases
- (b) Bacterial diseases
- (c) Algae
- (d) Protozoans

6. Define the following:
 - (a) pasteurisation
 - (b) food poisoning
 - (c) nitrogen fixation
7. What are the major groups of microorganisms? Discuss about them.
8. How are microbes useful to us? Write in about 100 words.
9. Communicable diseases are caused by microbes. Justify.
10. Discuss few methods of food preservation.
11. Briefly discuss the different steps of the nitrogen cycle.
12. Observe the chart carefully, and fill the gaps.



Think and Apply

1. Tick the correct option.
 - (a) Pasteurisation is a method used to preserve milk by
 - (i) lowering the temperature of the milk.
 - (ii) destroying harmful bacteria.
 - (iii) lowering the fat content of the milk.
 - (iv) fermenting the milk.
 - (b) Which of the following is **incorrectly** paired?

(i) bacillus – rod shaped	(ii) yeast – fermentation
(iii) bacteria – decomposers	(iv) fungi – cholera

- (c) Which of the following is not a bacterial disease?
- (i) Diarrhoea
 - (ii) Dengue
 - (iii) Tuberculosis
 - (iv) Typhoid
- (d) The rising of dough for making bhature is an example of
- (i) fermentation by bacteria.
 - (ii) fermentation by yeast.
 - (iii) pasteurisation.
 - (iv) maturing.
- (e) Which of the following is a plant disease?
- (i) Rust
 - (ii) Anthrax
 - (iii) Botulism
 - (iv) Athlete's foot

2. Give reasons for the following:

- (a) Viruses are considered to be the borderline between living and non-living things.
- (b) Shoes and clothes get mould during the rainy season.
- (c) Curd sets faster in summers than winters.

3. Find the odd one out.

- (a) measles, chickenpox, polio, cholera
- (b) typhoid, tuberculosis, cholera, AIDS
- (c) malaria, cancer, polio, smallpox

 **Analyse**

1. We know that vinegar is used as a preservative (Figure 2.14). But do you know why is it used for preservation?
2. Bhumi ate fruit salad from a roadside vendor. The fruits had been cut and exposed to dust and flies.
 - (a) What type of diseases has she exposed herself to?
 - (b) What does our stomach contain to defend our body against microbes?



Figure 2.14



Think Beyond

1. All living beings can die in a long period of unfavourable conditions, but bacteria can survive. Give reason.
2. The sealed packets of fried food are filled with nitrogen. Give reason.



Values to Learn

Falak was asked to submit a project report on mosquito-borne diseases in school. She visited a nearby hospital where her uncle was a doctor. Her uncle took her to a patient suffering from dengue disease. Falak talked to the patient and asked him about symptoms of this disease. She helped the patient in the recovery process.

- (a) Name the causative organism and the carrier of the disease.
- (b) Name the two symptoms which may have been told by the patient.
- (c) Identify two important values shown by Falak.



Create and Learn

FA

1. Make a poster highlighting the use of microbes.
2. Visit a doctor. Find out what are the common antibiotics used for some common diseases. Make a list of those antibiotics, their source and the diseases for which they are used. Prepare a short report on it.



3

Synthetic Fibres and Plastics

We Will Explore

- | | |
|---|----------------------------------|
| 3.1 Natural and artificial fibres | 3.4 Plastics |
| 3.2 Polymerisation and properties of synthetic fibres | 3.5 Types of plastics |
| 3.3 Types of synthetic fibres | 3.6 Plastics and the environment |

Collect some fibres of different cloth materials such as cotton, jute, silk, wool, acrylic, nylon, polyester and rayon. Burn each fibre in a candle flame (be careful while burning these fibres). Match your observations with those given in the table below.

Table 3.1 Candle test for different cloth materials

Material	Smoke during Burning	Residue after Burning	Smell of the Burnt Fibre
Cotton	Burns with a flare giving grey or white smoke	Leaves ash which is fine, soft and easily crushable and leaves no melted beads	Smells like burning paper
Silk	Burns slowly and curls away from the flame and gives out a little or no smoke, and the fumes are not hazardous	Leaves dark beads which can be easily crushed and ash which is dark, gritty and finely powdered	Smells like burned hair or charred meat
Wool	Burns quickly and can flare even after flames are removed and gives out dark smoke and moderate fume	Leaves beads that are brittle, dark and easily crushable, and leaves hard ash	Has strong odour of burning hair or feathers
Acrylic	Flares up, shrinks from flames, burns rapidly with hot flames, gives out black smoke and the fumes are hazardous	Leaves melting, hard and dark beads, with irregular shapes, and leaves no ash	Has strong acrid, fishy odour
Nylon	Burns quickly, shrinks away from the flame and after flames are removed, burns slowly and melt	Leaves hard, greyish and uncrushable beads and leaves no ash	Smells like celery
Polyester	Burns quickly, shrinks away from the flame; after flames are removed, burns slowly and melts; produces black smoke; and fumes are hazardous	Leaves hard, dark and round beads, and leaves no ash	Smells like slightly sweet chemical odour
Rayon	Burns without flame and smoke is hazardous	Leaves soft, grey ash and leaves no melted beads	Smells like burning paper

What do you observe from the table?

You will observe that cotton, silk and wool leave ash which may or may not have beads. If beads are produced, then they will be soft and crushable. On the other hand, nylon, polyester and acrylic do not leave ash after burning but they leave behind hard and non-crushable beads. This test shows the fact that cotton, silk and wool are natural fibres, whereas nylon, polyester and acrylic are man-made or synthetic fibres.

Enquire and Discuss 3.1

In Table 3.1, you can see that rayon shows different burning patterns from other fibres. Rayon is a semi-synthetic fibre. How? Find out similarities and dissimilarities between the burning pattern of natural and artificial fibres from Table 3.1

3.1 Natural and Artificial Fibres

Fibres that we get from plants and animals are called natural fibres.

Fibres that we process from chemical substances are called synthetic fibres.

Fibres that are produced by the chemical alteration of a natural starting material are called semi-synthetic fibres.

We have studied about natural fibres in our previous classes. In this chapter, we will study about man-made or synthetic fibres.

There are some fibres which we get from chemical substances and although they look and feel like natural fibres, they have properties different from natural fibres. Such fibres are called **artificial fibres**. For example, we have many varieties of synthetic materials that look and feel like silk (see Figure 3.1), but they are not the silk that we get from the silk moth (take the burning test).



Figure 3.1 Products made of artificial silk

3.2 Polymerisation and Properties of Synthetic Fibres

The process of obtaining synthetic fibres is different than that of natural fibres. Synthetic fibres are obtained by joining a chain of small units of chemical substances. Each single unit is called a **monomer** (one unit). Many monomers combine to form a single large unit called a **polymer**. The word 'polymer' comes from two Greek words *poly* + *mer* which mean *many* + *part/unit*. So, a polymer is made up of many repeating units.

A chemical process that combines several monomers to form a single polymer or a polymeric compound is called **polymerisation**.



To understand polymerisation, let us understand how polythene is prepared. Ethene is a hydrocarbon made up of 2 carbon and 4 hydrogen molecules. **When many ethene molecules combine together in a chain, they are called polythene.** It is the same polythene that you may have used multiple times while buying grocery or other similar products.

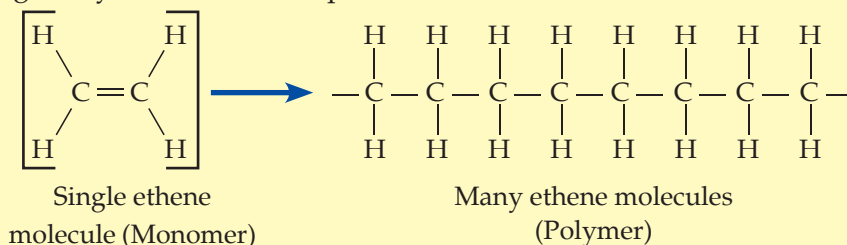


Figure 3.2

Polymers also occur in natural fibres. Cotton is a cellulose fibre which is a polymer made of glucose units.

Synthetic fibres are made by man in laboratories. They are durable, colour-resistant, easy to dry, easy to maintain and cheaper than the natural fibres. Synthetic fibres can withstand a lot of force without breaking. This property is known as **tensile strength** of the fibre. Synthetic fibres in general have higher tensile strength than natural fibres.

Activity 3.1

Aim: To check the tensile strength of synthetic fibres.

Materials required: threads (of same length) of cotton, silk, wool and nylon fibres; a clamp stand; one small pan; and a few gram weights

Procedure:

1. Tie the cotton thread on the clamp stand such that it hangs freely from it.
2. At the free end, suspend a pan in which weights can be placed.
3. Add weights one by one till the thread breaks. The weights added together will indicate the strength of the fibre.
4. Repeat the same activity with other threads.

Observation: Note down the total weight (in the table below) when the thread breaks.

Type of the Fibre	Total Weight (in grams) Required to Break the Thread
Cotton	
Wool	
Silk	
Nylon	

Conclusion: You will see that the nylon fibre has the maximum tensile strength.

Synthetic fibres are **elastic** and can be stretched to a certain extent. However, on releasing they retain their original shape. One of the important properties of synthetic clothes is that they neither shrink nor wrinkle. You can try this with different types of natural and artificial fibres by hanging wet clothes on a clothes line. See which one dries faster. Synthetic fibres dry out very fast as they have poor **water absorption** and retention property.

Activity 3.2

Aim: To understand water absorbent property of synthetic fibres.

Materials required: small but equal-sized pieces of nylon, cotton, silk and wool fabrics; a weighing balance; and a beaker filled with water

Procedure:

1. Weigh each fabric separately.
2. Soak each piece in water in the beaker. Let it stand for one minute. Weigh it again by using the weighing balance.
3. Repeat the process for each piece individually.

Observation:

1. Make a table and note down the weight of each piece before and after soaking. A table has been given below for reference.

Type of the Fabric	Weight of the Fabric before Soaking in Water	Weight of the Fabric after Soaking in Water
Cotton		

2. Which fabric absorbed maximum water?
3. Which fabric absorbed minimum water?

Conclusion: You will see that wool absorbed maximum water and nylon absorbed minimum water. This shows that synthetic fibres absorb minimum water.

Let us study properties of few synthetic (artificial) fibres.

3.3 Types of Synthetic Fibres

NYLON

Nylon is a synthetic fabric made from petroleum products. It is versatile in nature and relatively easy to make. Nylon is valued for its light weight, high tensile strength, durability,



Figure 3.3 Uses of nylon

and resistance to damage. It can be dyed easily in wide range of colours. Like most petroleum products, it has a very slow decay rate, which unfortunately results in the accumulation of unwanted products in landfills around the world.

It is a very flexible fibre that can be used in a wide range of applications, ranging from clothing to climbing equipment.

RAYON

Rayon is not a purely chemical fibre. It is made from chemically processed wood pulp. Wood pulp is a natural resource but it is chemically processed. Therefore, rayon is said to be a **semi-synthetic** fibre.

Rayon is very soft, cool and comfortable fibre. It has the same comfort property as natural fibres. It has very good absorbent property, but it is not able to protect body heat and so cannot be used in humid climatic conditions.

Science Diaries

Nylon

Nylon was developed in the 1930s as an alternative to silk, although it quickly became unavailable to civilian consumers because it was used extensively during World War II. Like many synthetic fibres, this material was developed by Wallace Carothers at the DuPont Chemical company, which continues to manufacture it till date. Today, nylon is among many polymer products which are commonly used in daily life throughout the world.

Rayon

Originally rayon was devised as a cheaper alternative to silk. It is used in making artificial silk clothing because it is highly lustrous but cheaper than silk with good draping quality. As the oldest man-made fibre, rayon has been in existence for over 100 years. In 1855, Georges Audemars, a Swiss chemist, discovered how to make cellulose nitrate. Later in 1884, Count Hilaire de Chardonnet made the first man-made fibre from nitrocellulose. He came to be known as the 'father of rayon'. He established the world's first rayon factory. Subsequently, other scientists developed more cost-effective ways of making many other types of rayon.



Figure 3.4 Uses of rayon

It can replicate the feel and texture of natural fibres such as silk, cotton and wool. Rayon finds use in fashion fabrics, making gauze for wounds and tyre chords. Rayon can easily be dyed in variety of colours.

POLYESTER

Polyester is the most common synthetic fabric. Polyester (poly + ester) is actually made up of the repeating units of a chemical called an ester. Fabrics made from this fibre do not get wrinkled easily. It remains crisp and is easy to wash. For these reasons, it is good for making cloth material. You may have seen people wearing polyester shirts and other dresses. Polyester blends well with other fabrics to produce strong and durable cloth materials.



Figure 3.5 Polyester blends

ACRYLIC

Acrylic fibres are synthetic fibres made from polyacrylonitrile. They are also known as orlon or acrilan fabrics. Acrylic fibres are used to substitute natural wool for making sweaters, gloves, fabrics, carpets, etc. Acrylic fibres make fine, soft and luxurious fabric. They have many appealing properties such as quick drying time, excellent colour fastness and draping, UV (kind of dangerous rays emitted by the sun) resistant, low maintenance and cost effective. It is increasingly becoming popular as a sports and outdoor wear.



1. Esters are the chemicals which give fruity smell.
2. Blends of polyester: Polyester-blended fabrics are sold by names such as polycot, polywool and terrycot. As the name suggests, these are made by mixing two types of fibres. Polycot is a mixture of polyester and cotton. Polywool is a mixture of polyester and wool. Terrycot is a mixture of terylene and cotton.
3. Terylene is popular polyester. It can be drawn into very fine fibres that can be woven like any other yarn.
4. PET (polyethylene terephthalate) is a well-known polyester polymer. PET is used in blended fabrics, such as polycot and terry wool, and also for making water bottles, fire hoses, sails of ships, curtains and draperies.



Figure 3.6 Uses of acrylic fibre

Off the Wall

Many of the woollen sweaters and shawls that we wear are not made up of animal wool. These are made up of acrylic that looks like wool. Pure wool is very expensive and needs to be taken care of. Acrylic on the other hand is cheap and does not need to be taken care of as we do for animal wool products.

Science Diaries

Acrylic was developed by DuPont in 1944 and was first produced commercially in 1950. Acrylonitrile was first made in 1893 in Germany. At that time DuPont was using it as another chemical in research. Originally acrylic was used for outdoor wear, but later on, due to advancement in technology it soon became popular in clothings and carpets. DuPont ceased the production of acrylic in 1991. Today, only a handful of companies produce acrylic.

Table 3.2 Uses and properties of synthetic fibres

<p>Rayon</p> 	<p>Properties</p> <ul style="list-style-type: none"> • Absorbent, dries slowly • Good drape • Not durable • Creases easily
<p>Acrylic</p> 	<p>Properties</p> <ul style="list-style-type: none"> • Non-absorbent, fast drying • Durable • Crease resistant • Easy care
<p>Nylon</p> 	<p>Properties</p> <ul style="list-style-type: none"> • Absorbent, dries slowly • Creases drop out • Can shrink—dry clean • Good drape • Durable
<p>Polyester</p> 	<p>Properties</p> <ul style="list-style-type: none"> • Non-absorbent, fast drying • Good drape • Thermoplastic • Very durable • Crease resistant, easy care

Enquire and Discuss 3.2

Blends of Natural and Synthetic Fabric

As the name would suggest, fabric blends are created by twisting and combining natural fibre with a synthetic fibre. Using fabric that is created by combining two types of fibres is a pragmatic approach to create a desirable fabric. Natural fibres can sometimes cause skin irritation but provide a lot of warmth. Combining a natural fibre with a synthetic fibre can give the fabric its durability and warmth, comfort, aesthetic appeal, sheer resistant to wrinkles or any other number of combined qualities for our use.

- 1 What are the advantages and disadvantages of using a pure natural fabric?
- 2 What are the advantages and disadvantages of using a pure synthetic fabric?
- 3 What are the advantages of using blends of natural and synthetic fibres?
- 4 Parachute ropes are made up of synthetic fibres.
 - (a) What possible disadvantages will the blend fibre have for making such ropes?
 - (b) Why steel or other metals are not good for making these ropes?

3.4 Plastics

Plastic is used as an integral part in our day-to-day lives. Objects below are made up of plastic. Plastics are also polymers. All plastics do not have the same type of arrangement of monomer units. In some it is linear, whereas in others it is cross-linked. But these polymers can be melted and moulded.

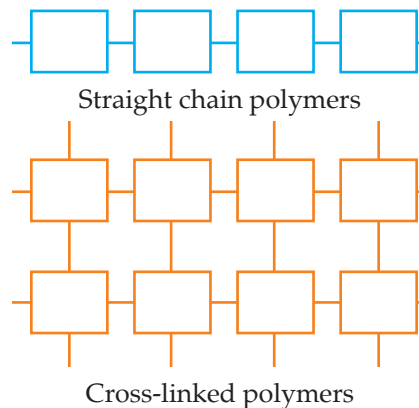


Figure 3.7 Some plastic objects

PROPERTIES AND USES OF PLASTICS

Plastics have numerous properties that make them superior to other materials. Plastics are generally resistant to **corrosion**, **chemicals** and **electric shocks**. They have **low electrical** and **thermal conductivity** and high strength-to-weight ratio. They can be manufactured in transparent look or blended in a wide variety of colours. They are **durable**, **easy to manufacture** and **cost effective**. Plastics can be hard or soft and rigid or flexible.

Plastics find extensive use in the health-care industry. They are used in the packaging of tablets, making syringes, doctors' gloves and a number of medical instruments. Threads made of plastic are used for stitching wounds. Special plastic cookware is used in microwave ovens for cooking food. Teflon is a special plastic on which oil and water do not stick. It is used for non-stick coating on cookware.

3.5 Types of Plastics

Plastics can be divided into three major categories.

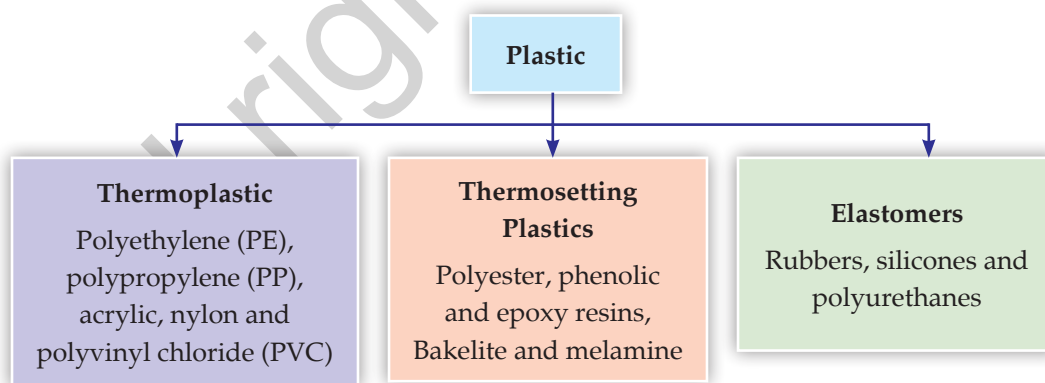


Figure 3.8 Thermoplastics

THERMOPLASTICS

Thermoplastics can be given a desired shape by melting as and when desired. They can be repeatedly melted and given new shapes. They are relatively flexible plastics and are less rigid than the thermosetting plastics. They can be easily moulded and extruded into films, fibres and packaging.

THERMOSETTING PLASTICS

Thermosetting plastics can be heated only once. Once permanently set into a solid pattern, they cannot be melted again and reshaped. They are hard and durable. Because of their rigidity, they are used for manufacturing auto parts, aircraft parts and tyres.

ELASTOMERS

Polymers that are **viscous** in nature and possess **elasticity** are called **elastomers**. Characteristic properties of elastomers include flexibility, high elongation and damping (property of rubber that causes it to convert mechanical energy into heat energy when subjected to deflection). This unique set of properties makes elastomers an ideal material for gaskets, seals, isolators, etc.

3.6 Plastics and the Environment

Excessive use of plastics causes environmental pollution because they are non-biodegradable. You have read about biodegradable and non-biodegradable materials in the previous classes. A material which gets decomposed through natural processes, such as action by bacteria, is called **biodegradable**. A material which is not easily decomposed by natural processes is termed as **non-biodegradable**.



Figure 3.9 Thermosetting plastics



Figure 3.10 Elastomers

Enquire and Discuss 3.3

- 1 Why are plastics preferred for storing chemicals?
- 2 A person has to make a non-stick pan. He has three types of plastics: Bakelite, Teflon and PVC. Which plastic will he use for non-stick coating and why?
- 3 Buckets made up of plastic are better. Why?
- 4 Why is melamine used for making fire resistance fabric?
- 5 Explain why plastic containers are favoured for storing food.

Viscous: a thick, sticky and consistent liquid






Elasticity: the ability of an object or material to resume its normal shape after being stretched or compressed



Plastic materials are everywhere. Globally, we use 160,000 plastic bags every second. We use plastic bags, straws and plastic bottles for a short time and then dispose it of. Disposal of plastics is a big problem.

These plastics when thrown in landfills or elsewhere, find their way into the oceans, killing the marine animals that mistake them for food. This is just the tip of the plastic garbage issue that's alarming environmentalists these days.

Toxic materials such as **benzene** and **vinyl hydrochloride** are used in the production of plastic. **These chemicals are known to cause cancer, and the manufacturing by-products contaminate our air and soil. The two types of plastic that are the major source of toxin are PVC and phthalates** (pronounced as tha-lates). Plastics in general are not good for our environment, but it has found extensive use in our day-to-day lives. We should be careful which plastic we are using. Plastics are given identification codes and are used as per these codes.

Table 3.3 Uses of plastics in our day-to-day lives

Code	Plastic Used	Common Uses	Recycled in
	Polyethylene terephthalate (PET)	Soft drink/water/juice bottles and detergent/cleaner/butter containers	Pillow and sleeping bag filling, clothing, soft drink bottles and carpets
	High-density polyethylene (HDPE)	Opaque milk and water jugs, bleach/detergent/shampoo bottles and some plastic bags	Recycling bins, compost bins, buckets, detergent containers, fencing and pipes
	Polyvinyl chloride (PVC)	Cling wrap, some plastic squeeze bottles, cooking oil and peanut butter jars and detergent/window cleaner bottles	Flooring, films and sheets; cables; speed bumps; packaging; binders; mud flaps and mats
	Low-density polyethylene (LDPE)	Grocery bags, most plastic wraps, some bottles and square/round canisters	Garbage bin liners and pallet sheets
	Polypropylene (PP)	Yoghurt containers, straws and other clouded plastic containers	Bins, pipes, pallet sheets, oil funnels, car battery cases and trays

	Polystyrene (PS)	Styrofoam food trays, egg cartons, disposable cups and bowls, carryout containers and plastic cutlery	Coat hangers, coasters, stationary trays and accessories
	Others: plastics not categorised in the six categories above	Car parts, appliance parts, computers, electronics and packaging	Car parts, concrete aggregate and plastic timber

Off the Wall

Plastics are often printed with an identification code which is used inside the recycle symbol. This numerical code indicates the material used to make the plastic, allowing plastics to be sorted for recycling. Consumers also use these codes to gather information about the plastics they use, as some codes have specific uses or safety precautions. These codes are universal, making global plastic handling much easier.

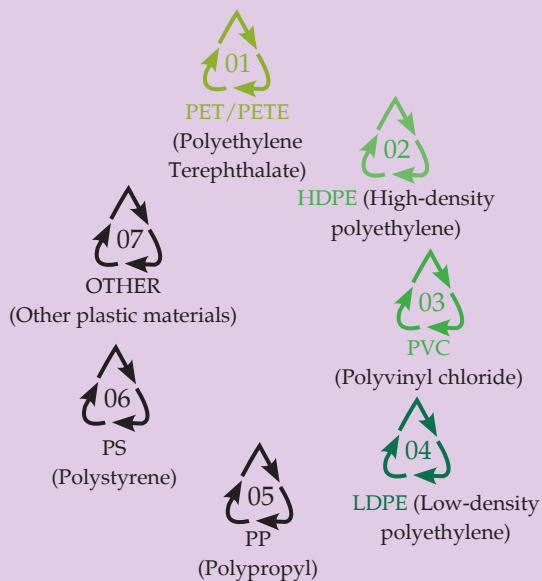


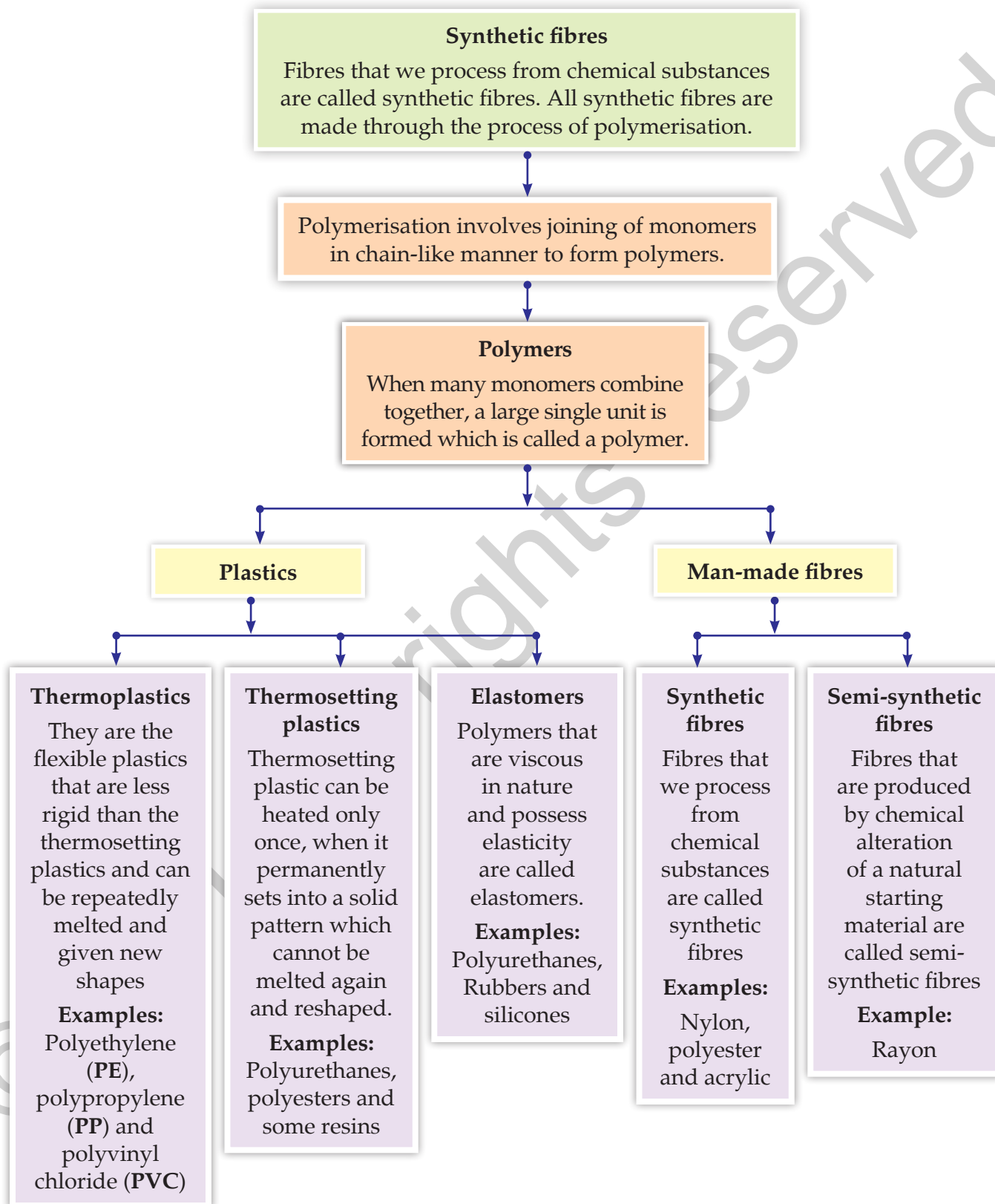
Figure 3.11 Plastic Recycling Symbols

How can we know whether the plastic we are using is safe or not?

For this we need to know which numbered plastic is safe to use and which numbered plastic we should avoid.

Plastic We Can Use	Plastic We Should Avoid
	 Plastics marked 7 are usually polycarbonate, but may be other types of non-recyclable plastic.
	 Plastics marked 3 are PVC plastic, a dangerous chemical sometimes used in plastic squeeze bottles and peanut butter jars.
Plastics marked 1, 2, 4 and 5 are safe to use.	 Plastics marked 6 are made with polystyrene, a chemical used in Styrofoam food trays that can cause damage to the brain and the nervous system.

Concept FLOW





Check Your Knowledge

1. Tick the correct option.

(a) _____ is used for making mountaineering ropes.

- (i) Nylon (ii) Cotton (iii) Wool (iv) Terrylene

(b) The first cheap alternative to silk was

- (i) nylon. (ii) rayon. (iii) acrylic. (iv) cotton silk.

2. Fill in the blanks.

(a) Fibres that we get from plants and animals are called _____ fibres.

(b) Fibres that we process from chemical substances are called _____ fibres.

(c) Many monomers combine to form a single large unit called a _____ .

(d) _____ is very soft, cool and comfortable fibre.

(e) Acrylic is used as an imitation to _____ .

3. Differentiate natural and synthetic fibres. Why synthetic fibres are preferred over natural fibres?

4. Write three points differentiating between biodegradable and non-biodegradable materials.

5. Write three advantages and three disadvantages of plastics.

6. Write the characteristic properties and uses of the following:

- (a) polyester (b) rayon (c) acrylic (d) nylon

7. Write two uses of acrylic fibres.

8. Define the following in your own words.

- (a) Thermoplastics (b) Thermosetting plastics (c) Elastomers



Think and Apply

1. Tick the correct option.

(a) Synthetic fibres

(i) absorb more water as compared to natural fibres.

(ii) absorb less water as compared to natural fibres.

(iii) absorb equal water as natural fibres.

(iv) do not absorb water.

(b) This fibre when mixed with cotton can make bed sheets and when mixed with wool can make carpets. Which fibre is this?

- (i) Polyester (ii) Rayon (iii) Acrylic (iv) Polyethene

(c) _____ is used for coating utensils used for cooking food.

- (i) Melamine (ii) Teflon (iii) Nylon (iv) Acrylic

2. Why are synthetic fibres cheaper than natural fibres?
3. Laura wants to buy shirts for summer. Should she buy cotton shirts or shirts made from synthetic material? Advise her with reason.
4. Most of the camping clothing is made from nylon. Why?
5. Discuss the importance of the numbering system for plastics in our lives.
6. Write two uses of plastics in health-care industry.
7. 'Once cooled and hardened, these plastics retain their shapes and cannot return to their original form'. Name the type of plastic.

Analyse

1. Read the passage carefully and answer the questions that follow.

Passage: In a recent study, scientists found that the water in washing machines is full of tiny particles of plastic. As per the calculations conducted, each time you wash a synthetic shirt, nearly 2000 microparticles of plastic are released. These microparticles make their way to the ocean through different waterbodies and affect the aquatic food chain. Chemicals such as PCBs (polychlorinated biphenyls), DDT and few other toxic chemicals cannot dissolve in water, but the plastic absorbs them like a sponge. Fishes that feed on planktons (the small or microscopic organisms that drift or swim weakly in a body of water, including bacteria, diatoms, jellyfish and various larvae) ingest the tiny plastic particles. Researchs say that fish tissue contains some of the same chemicals as the plastic and that toxic chemicals are leaching (filtering) into fish tissue from the plastic they eat. When a bigger fish, an animal or a human being eats these fishes, the toxins are transferred from these fishes to whoever eats them. And in this way, toxin from multiple food sources can get accumulated in our bodies making us prone to diseases.

- (a) What are synthetic materials? Give two disadvantages of wearing synthetic clothes.
 - (b) Release of 2000 microparticles of plastic per shirt is not too much. How does it contribute to toxin level in aquatic dwellers?
 - (c) Give a food chain that includes both small fishes and human beings.
 - (d) Give a suitable title to the passage.
2. Analyse the given picture and explain why we prefer synthetic fibre over natural fibre.



Figure 3.12



Think Beyond

1. Which is an eco-friendly bag: a jute bag or a plastic bag? Give reasons.
2. The use of fibre-filled quilt is very common nowadays. What is this type of quilt made up of? How is it better and worse than the traditional cotton-filled quilts? Give two points each.
3. Why does hot water deform plastic bottles?
4. Should the handle and bristles of a toothbrush be made of the same material? Explain your answer.
5. Why are plastic materials such as polythene preferred over natural materials?
6. Give some uses of PVC.



Values to Learn

1. Describe the cultural differences between 'natural' and 'synthetic' fabrics. Do you or people around you think about the two types of fabrics differently? Are such perceived differences related to the chemical properties of the fibres?
2. 'Manufacturing synthetic fibres is actually helping conservation of forests'. Comment.



Create and Learn

FA

1. Make a project report on 'numbering given to recycled plastic'. Check whether the type of plastic you are using in your day-to-day life is safe or not.
2. Make a poster on discouraging the use of plastics. Write an attractive slogan on your poster.
3. There are certain governmental and non-governmental organisations that educate general public on how to make a wise use of plastics and develop environment-friendly habits. Find out organisations in your area which are carrying out awareness programmes. If there is none, form one.