

## TOPICS COVERED

- 3.1 Synthetic Fibres : Characteristics, Types and Their Uses    3.2 Plastics : Types, Characteristics and Uses
- 3.3 Plastics and the Environment

## IMPORTANT POINTS TO REMEMBER

- **Fibre:** A fibre is a hair-like strand of material, which can be spun into yarn and made into fabrics.
- **Natural Fibres:** Fibres which are obtained from nature are called natural fibres. *Example:* cotton, wool, jute and silk are obtained from plants and animals.
- Some of the *natural polymers* are – Cellulose, silk, wool, proteins etc.
- Some of the *synthetic polymers* are – nylon, polyethene, polyvinyl chloride, rayon and teflon.

## 3.1 SYNTHETIC FIBRES : CHARACTERISTICS, TYPES AND THEIR USES

**Synthetic Fibres:** Fibres which are prepared artificially in factories are called synthetic fibres. *Example:* Rayon, Nylon, Polyester, Acrylic.

**Polymer:** A polymer is a long chain like unit consisting of a large number of smaller molecules, monomer joined to each other by a chemical bond.

**Monomer:** Each small unit made up of chemical substance which joins together to form a large macromolecule, a chain of polymer is called monomer.

**Polymerisation:** The process of combining the monomers to form a polymer under conditions of high temperature and pressure is called polymerisation.

*Example:* If a simple molecule is A, then the polymer is represented as A-A-A-A ... A, or  $(\text{---} A \text{---})_n$ .

### Characteristics of Synthetic Fibres

- They are very strong and durable.
- They absorb very little water.
- They are wrinkle resistant.
- They are quite light in weight.
- They do not shrink.
- They are less expensive and readily available.
- They are easy to maintain.
- They are poor conductors of heat and electricity.

### Types of Synthetic Fibres

**Rayon:** It was the first man-made (or synthetic) fibre obtained by chemical treatment of wood pulp. It is also called artificial silk, since it resembles natural silk in texture.

### *Properties*

- It is lustrous and shiny.
- It does not melt.
- It burns at high temperature.
- It absorbs heat.
- It is less expensive.

### *Uses*

- It is used for making ties, suits, shirts, blouses, jackets.
- It is mixed with wool to make carpets.
- It is also used to make automobile tyre cords.

**Nylon:** It was the first fully synthetic fibre to be entirely made up of chemicals. It was produced from coal, air and water.

### *Properties*

- It is strong and elastic.
- It is light, wrinkle resistant and easy to wash.
- It dries quickly.
- It is lustrous.
- It absorbs very little water.

### *Uses*

- It is used to make ropes for rock climbing and parachutes fabric.
- It is also used for making nets, zip fasteners and machine parts.

**Polyester:** It is another synthetic fibre made up of the repeating units of an ester, which is a monomer.

*Forms of Polyester* – Terylene, Dacron, Terene, PET

### *Properties*

- It is compact and do not occupy space.
- It is easy to wash and maintain.
- It is wrinkle free.
- It dries up quickly.

### *Uses*

- Being light in weight, it is used as sails for boats.
- It is used as dress material fabrics.
- PET is a form of polyester used for making bottles, utensils, wires etc.
- Polyester films are used for making tapes.

**Acrylic:** It is another synthetic fibre which resembles natural wool. It is also known as ACRILAN and ORLON.

### *Properties*

- It is light, soft and warm.
- It is washable and shrink proof.

### *Uses*

- It is used for making woollen garments, carpets, blankets etc.
  - It is used in acrylic paints and in modern fine arts.
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## Disadvantages of Synthetic Fibres

- It melts quickly. It catches fire and shrinks to form beads and stick to the skin.
- It is non-biodegradable.
- It causes skin problems to some people.

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## Exercise 3.1

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### I. Very Short Answer Type Questions (1 Mark)

1. Name the unit of which cellulose polymer is made.
2. State one disadvantage of using synthetic fibres for making clothes.
3. Arrange the following fibres in the order of increasing strength:  
Nylon, Cotton, Wool, Polyester, Silk.
4. Give one word for the following:
  - (a) Hair like strand material. \_\_\_\_\_
  - (b) A fibre used in automobile tyre cords. \_\_\_\_\_
  - (c) A fibre which is very strong and elastic. \_\_\_\_\_
  - (d) With cotton, it makes polycot. \_\_\_\_\_
  - (e) Also known as Acrilan and Orlon. \_\_\_\_\_
5. Fill in the blanks:
  - (a) \_\_\_\_\_ is a synthetic fibre made from cellulose.
  - (b) \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ are different forms of polyester.
  - (c) \_\_\_\_\_ is also called artificial silk.
  - (d) \_\_\_\_\_ is used for making ropes for rock-climbing.
  - (e) \_\_\_\_\_ is a popular polyester which is lustrous and easy to wash.

### II. Short Answer Type Questions-1 (2 Marks)

6. What is a polymer?
7. Give examples of natural fibres.
8. Write two properties of polyester fibre.
9. Write any two advantages of synthetic fibres over natural fibres.
10. Give two uses of nylon.
11. What is PET? what is its use?
12. To which kind of synthetic fibre does terylene belongs? Give its use.
13. Nylon is a popular dress-material. Why?
14. Why is rayon called artificial silk?
15. What is acrylic? State one important use of acrylic.
16. What is polyester? Name a popular polyester.
17. Why some fibres are called synthetic? [NCERT]
18. Why is nylon used for making ropes for rock-climbing?

### III. Short Answer Type Questions-2 (3 Marks)

19. Why should we not wear clothes made of synthetic fibres while working in the kitchen?
  20. What type of shirts should we buy for summer- Cotton shirts or shirts made from synthetic fibres? Give reason for your answer. [NCERT]
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21. Give examples which indicate that nylon fibres are very strong. [NCERT]

#### IV. Long Answer Type Questions (5 Marks)

22. State the characteristics of synthetic fibres.
23. (a) What is Rayon? How is Rayon made?  
(b) Give any two uses of Rayon.
24. Why synthetic fibres have become more popular than natural fibres?
25. With the help of an activity, show that nylon is strongest among natural as well as synthetic fibres.
26. With the help of an activity, show that synthetic fibres absorbs less water and takes less time to dry as compared to natural fibres.
27. What is a synthetic fibre? How is it formed?

#### ANSWERS

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| <p>1. Glucose</p> <p>2. (a) Synthetic fibre melts quickly. It catches fire and shrink to form beads and stick to the skin.<br/>(b) It is non-biodegradable.<br/>(c) It causes skin problems to some people. (Anyone)</p> <p>3. Cotton &lt; Wool &lt; Silk &lt; Polyester &lt; Nylon (strongest).</p> <p>4. (a) fibre (b) nylon<br/>(c) nylon (d) polyester (e) acrylic</p> <p>5. (a) Rayon<br/>(b) Terylene, PET, Dacron<br/>(c) Rayon (d) Nylon (d) Terylene</p> <p>6. A polymer is a long chain like unit consisting of a large number of smaller molecules, monomers joined to each other by chemical bond.</p> <p>7. Cotton, Silk, Jute, Wool</p> <p>8. (a) Polyester fibre is compact and do not occupy space.<br/>(b) It is easy to wash and maintain.</p> <p>9. (a) Synthetic fibres are cheaper and less expensive.<br/>(b) They are wrinkle-free and easy to maintain.</p> <p>10. (a) Nylon is used in making fishing nets and parachutes.<br/>(b) It is also used in the production of dress-material like sarees, shirts etc.</p> <p>11. PET is Polyethene terephthalate which is a familiar form of polyester.</p> | <p>It is used in making bottles for selling drinks etc.</p> <p>12. Terylene belongs to <i>polyester</i><br/>It is lustrous and easy to wash, hence used to make dress materials.</p> <p>13. It is lustrous and easy to wash.</p> <p>14. Rayon resembles natural silk in its texture.</p> <p>15. Acrylic is a synthetic fibre which resembles natural wool.<br/>It is used for making synthetic carpets, woollen garments.</p> <p>16. Polyester is a synthetic fibre which is made up of monomer 'ester'. Terylene is a popular polyester.</p> <p>17. Because we they are prepared artificially by man.</p> <p>18. Nylon fibres are used for making ropes for rock climbing, parachutes, stitching wounds in surgery which indicates that they are strong fibres.</p> <p>19. We should not wear synthetic clothes while working in the kitchen because it melts quickly on heating and if it catches fire, it shrinks to form beads and stick to the skin.</p> <p>20. We should buy cotton shirts as it absorbs water quickly and evaporates faster which gives us cooling effect. Therefore, we feel comfortable in cotton clothes in summer.</p> |
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21. Nylon is very strong and elastic.
22. (a) Synthetic fibres are very strong and durable.
- (b) They absorb very little water.
- (c) They are wrinkle resistant.
- (d) They are quite light in weight.
- (e) They do not shrink.
- (f) They are less expensive and readily available.
- (g) They are easy to maintain.
- (h) They are poor conductors of heat and electricity.

23. (a) Rayon is a synthetic fibre. It is obtained from chemical treatment of wood pulp. It is dissolved in an alkali solution and passed through tiny pores to form fibres, which are spun into yarn and woollen into fabric. It resembles natural silk in its texture and hence it is called artificial silk.

- (b) • It is used for making ties, suits, shirts, blouses, jackets.
- It is mixed with wool to make carpets.

24. (a) Synthetic fibres are very strong and durable.

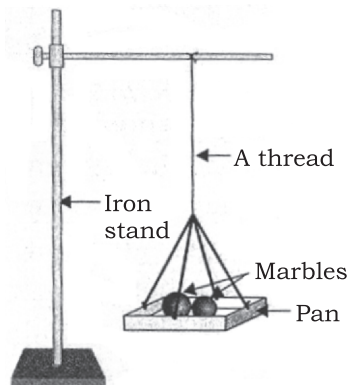
- (b) They absorb very little water.
- (c) They are wrinkle resistant.
- (d) They are quite light in weight.
- (e) They do not shrink.
- (f) They are less expensive and readily available.
- (g) They are easy to maintain.
- (h) They are poor conductors of heat and electricity and hence preferred more than natural fibre.

25. *Aim:* To compare the tensile strength of different fibres of the same thickness and same length.

*Things needed:* Threads (30 cm in length) of cotton, wool, silk and nylon, an iron stand with a clamp, a pan, and marbles (of the same weight and size).

*Method:*

- (i) Take a cotton thread of about 30 cm in length and tie its one end to the clamp, and left other end suspended freely. An iron stand with a thread hanging from the clamp.



- (ii) At the free end of the cotton thread, suspend a pan, so that weight can be placed on it.
- (iii) Gently put marbles one by one on the pan, till the cotton thread breaks.
- (iv) Record the total number of marbles required to break the cotton thread. The total number of marbles required to break the cotton thread is the measure of its tensile strength.
- (v) Repeat the activity with threads of wool, silk and nylon. Record the total number of marbles required to break the thread in each case.

*Observation:* It is observed that nylon thread holds maximum number of marbles before it is broken, followed by silk, cotton and wool (least strong). The thread which holds the maximum number of marbles is the strongest.

*Precaution:* All threads should be of the same length and almost the same thickness.

*Conclusion:* Tensile strength of nylon (synthetic fibre) is more than that of silk, cotton and wool.

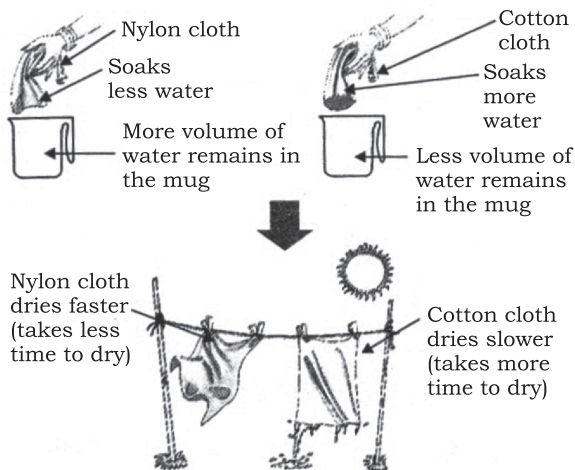
26. *Aim:* To compare the water absorbing capacity of nylon (synthetic) and cotton (natural) fabrics.

*Things needed:* One piece of cotton cloth and one piece of nylon cloth (half a metre square each) and 2 equal size mugs.

*Method:*

- (i) Take two mugs, each containing the same amount of water in it.

- (ii) Take two pieces of clothes (one nylon and other cotton) of the same size.
- (iii) Soak each piece of cloth in water taken in different mugs.
- (iv) Take the pieces out of the mugs after five minutes and spread them in the sun for few minutes.
- (v) Observe and compare the volume of water remaining in each mug.



- (vi) Also, compare the time taken by each piece of cloth to dry completely.

Water absorbing capacity of nylon and cotton fabrics.

*Observation:*

- (a) The volume of water remaining in the mug from which nylon cloth was removed is more than the volume of water remaining in the mug from which cotton cloth was removed.

*Conclusion:* The water absorbing capacity of cotton cloth is greater than that of nylon cloth.

*Precaution:* The mugs should be of identical volume and cloth pieces should be of identical length.

- 27. Fibres obtained through different chemical processes in the industries are known as human-made or synthetic fibres. They are prepared using raw materials of petroleum origin called petrochemicals.

A synthetic fibre is a long chain of many repeating units made up of chemical substances. It is also called a polymer and is formed when several monomer (repeating unit) combine together to form a large macromolecule (polymer).

## 3.2 PLASTICS : TYPES, CHARACTERISTICS AND USES

**Plastics:** A plastic is a synthetic material which can be moulded (or set) into desired shape when soft and then hardened to produce a durable article. Plastics are also polymers.

Plastics are basically obtained from petroleum products called petrochemicals.

- Plastics find a variety of uses since they can be moulded into any desired shape, recycled, coloured, rolled into sheets and even made into wires.
- Examples of plastics are – Polyethene, Polyvinyl chloride (PVC), Bakelite, Melamine, Teflon etc.

**Types of Plastics:** There are two types of plastics: Thermoplastics and Thermosetting plastics (Thermosets).

*Thermoplastics:* Plastics which can be softened repeatedly by heating and can be moulded into different shapes again and again are called a thermoplastics. In a thermoplastic:

- The arrangement of molecules is linear.
- These are soft plastic.
- *Examples:* Polyethene and Polyvinyl chloride.

*Thermosetting plastics:* Plastics which once set, does not become soft on heating and cannot be moulded again for the second time are called thermosetting plastics. In a thermoset:

- The arrangement of molecules is cross-linked.
- These are hard plastics.
- *Examples:* Bakelite, Melamine.

### **Characteristics of Plastics**

- They are non-reactive, i.e. they do not react with air and water. They do not corrode easily.
- They are light in weight, strong and durable.
- They are poor conductors of heat and electricity.
- They are insoluble in water.
- They do not burn easily hence are non-biodegradable.

### **Uses of Plastics**

- They are used as plastic containers for storing food and sometimes even chemicals, as they are *non-reactive*.
- They are used to make handles of frying pans, as they are poor *conductors of heat*.
- They are used to make electric switches, as they are poor *conductors of electricity*.
- They are also used to make coverages for line electric wires, as they are insulators.
- They are used to make a variety of articles like bucket, mugs, furniture, bags, sheets etc. as they can be *easily moulded*.
- They are generally *cheaper than metals*. Hence they are used to make household articles and used even in different industries.
- They are *light in weight yet strong*, so they are used to make parts of aircrafts, cars etc.
- They are also used in healthcare industry like packaging of tablets, doctor's syringes, gloves, threads for stitching etc.
- *Teflon* is used as a non-stick coating over frying pans.
- It is also used as fire fighting dress material since it can resist fire and tolerate heat quite effectively.

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## **Exercise 3.2**

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### **I. Very Short Answer Type Questions (1 Mark)**

1. Which type of plastics has cross-linked polymer chains?
  2. Name the property of plastic which is used for storing water in bottles.
  3. Name the property of plastics which is responsible for storing food in plastic container.
  4. Give one word for the following:
    - (a) Plastic is also a \_\_\_\_\_
    - (b) Plastics are basically obtained from \_\_\_\_\_
    - (c) Plastic obtained from polymerisation of ethene \_\_\_\_\_
    - (d) Plastic used as sewage pipes at home \_\_\_\_\_
    - (e) Plastic used in making electric switches \_\_\_\_\_
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(f) Plastic which can resist fire and tolerate heat in a better way \_\_\_\_\_

(g) A plastic used as a non-stick coating on frying pans \_\_\_\_\_

5. Fill in the blanks:

(a) \_\_\_\_\_ is a thermoplastic.

(b) \_\_\_\_\_ plastics are used for making electric switches.

(c) \_\_\_\_\_ plastics cannot be recycled.

(d) In \_\_\_\_\_ plastics, the arrangement of molecules is cross-linked.

(e) The full form of PET is \_\_\_\_\_.

(f) Plastics are resistant to \_\_\_\_\_.

(g) \_\_\_\_\_ is used as a non-sticking coating in cooking wares.

(h) Plastics are used for storing water and bottles as they are \_\_\_\_\_  
in water.

## II. Short Answer Type Questions-1 (2 Marks)

6. Name the plastic which is used to make electric switches. What type of plastic is it?
7. Which type of plastics is used for making flexible water bottles and why?
8. Which plastic is used for making handles of frying pans? Why?
9. Which plastic is coated on the uniform of fire-fighting men to make them fire-resistant. Why?
10. Why are plastics favoured for storing chemicals?
11. Why are thermoplastics not used for making frying pan handles?
12. What is the full form of PVC? Is it a thermoplastic or thermoset?

## III. Short Answer Type Questions-2 (3 Marks)

13. Why are frying pan handles made up of thermosetting plastics? [NCERT]
14. Why are electric switches and sockets made up of thermosetting plastics? [NCERT]
15. Should the handle and bristles of a toothbrush be made of the same type of plastic material. Explain. [NCERT]
16. Give two uses of plastics in health care industry.
17. Why is plastic preferred over metals as storage containers.
18. Give examples to show that plastics are non-corrosive in nature.
19. What are plastics? Name any two commonly used articles made of plastics.
20. Name the different types of plastics. Give one example of each.

## IV. Long Answer Type Questions (5 Marks)

21. Distinguish between thermoplastics and thermosetting plastics. (NCERT)
  22. Plastics finds a variety of uses in our daily life. Justify the statement.
  23. With the help of an activity, show whether plastic is a poor or a good conductor of electricity.
  24. State four characteristics of plastics.
  25. Explain, why thermosetting plastics do not become soft on heating, while thermoplastics become soft easily on heating. Draw a diagram to illustrate.
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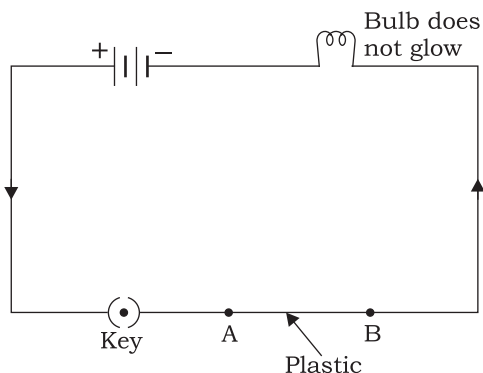


## ANSWERS

1. Thermosetting plastics
2. Plastics are non-reactive and insoluble in water.
3. Plastics are non-reactive and do not corrode.
4. (a) polymer (b) petrochemicals  
(b) polyethene (d) PVC  
(e) Bakelite (f) Melamine  
(g) Teflon
5. (a) Polythene (b) Thermosetting  
(c) Thermosetting (d) Thermosetting  
(e) Polyethene terephthalate  
(f) fire/heat (g) Teflon  
(h) insoluble
6. Bakelite – Thermosetting plastic
7. Thermoplastics, since they can be heated and easily moulded again and again.
8. Thermosetting plastics since they are poor conductors of heat.
9. Melamine, since it is resistant to fire and tolerate heat better than any other plastic.
10. Plastics are non-reactive and do not corrode.
11. Thermoplastics, on heating, soften and can change its shape.
12. PVC is Polyvinyl chloride. It is a thermoplastic.
13. Thermosetting plastics once moulded, do not soften on heating. Therefore thermoplastics are not suitable for making handles of frying pan, which are used for frying purposes in cooking.
14. Thermosetting plastics are poor conductors of electricity. Therefore switches and sockets are made using thermosetting plastics, so that one does not get an electric shock on touching it.
15. No, the handles of a brush should be made from a thermosetting plastic so that it does not bend, while the bristles should be soft so that they can bend easily while cleaning the corners of the teeth.
16. (i) Plastics are used for packaging of tablets, capsules etc.  
(ii) It is also used to make syringes, doctors gloves, threads for stitching etc.
17. Metals have a tendency to corrode or react with chemicals, while plastics are non-reactive and do not corrode.
18. (a) They are used for storing food material, thermoset.  
(b) They are used in packaging of tablets, threads used for stitching wounds etc.
19. A plastic is a synthetic material which can be moulded (or set) into desired shape when soft and then hardened to produce a durable article, plastics are also polymers. Plastics are basically obtained from petroleum products called petrochemicals.  
*Examples:* Bottles, buckets, polythene
20. There are two different types of plastics:  
(i) Thermoplastics – Polyethene, PVC  
(ii) Thermosetting plastics – Bakelite, Melamine.

	<b>Thermoplastics</b>	<b>Thermosetting plastics</b>
21.	(i) A plastic, which can be melted repeatedly by heating, hardened on cooling and can be moulded again and again.	A plastic which once moulded into a particular shape does not become soft on heating and cannot be moulded again for the second time.
	(ii) They become soft on heating.	They do not become soft on heating.
	(iii) The arrangement of molecules is linear.	The arrangement of molecules is cross-linked.
	(iv) They can be recycled. <i>Example:</i> Polyethenes, PVC	They cannot be recycled. <i>Example:</i> Bakelite, Melamine, Formica.

22. Plastics find a variety of uses since they can be easily moulded into different shapes, recycled, coloured, rolled into sheets and even moulded to form wires. Properties like easy handling, a good strength and better durability also make plastics highly useful for various daily life purposes.
23. *Aim:* To show that plastic is a poor conductor of electricity.



*Method:*

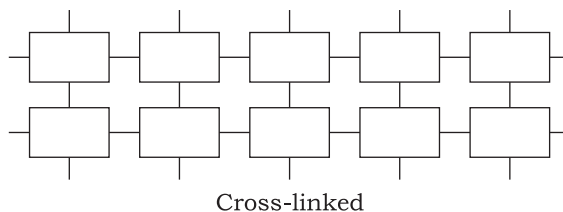
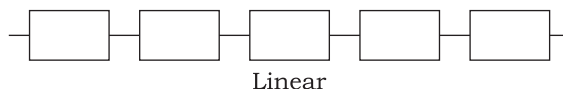
- (a) Take a plastic material. Connect it to the terminal of a battery as shown in the figure.
- (b) Switch on the current and observe.  
*Observation:* The bulb does not glow. This means that plastic does not conduct electricity.

*Result:* Plastic is a poor conductor of electricity.

24. (a) They are non-reactive i.e. they do not react with air and water and therefore do not corrode easily.
- (b) They are light in weight, strong and durable.
- (c) They are poor conductors of heat and electricity.
- (d) They are insoluble in water.
- (e) They do not burn easily hence are non-biodegradable.  
 (Any four)

25. In thermosetting plastics, the arrangement of molecules is cross-linked. So, on heating once set it cannot be moulded again.

In thermoplastics, the arrangement of molecules is linear. So on heating, it softens and can be moulded again.



Arrangement of molecules in different plastics.

### 3.3 PLASTICS AND THE ENVIRONMENT

**Biodegradable Substance:** A material which gets decomposed through natural process, i.e. by the action of bacteria are called biodegradable substances.

*Example:* plant, paper, animal wastes, cloth etc.

**Non-biodegradable Substance:** A material which is not easily decomposed by natural processes (such as the action of bacteria) is called non-biodegradable substances.

*Example:* plastics, glass, tin, aluminium etc.

#### Effect of Plastics on the Environment

- Plastic is a non-biodegradable substance.
- The waste plastic articles (polyethene bags) thrown here and there carelessly get into the dirty water drains and sewers, and clog them (block them). This makes the drain water to flow over the streets and roads causing unhygienic conditions.

- Animals like cows may eat up the used polythene bags or plastic wrappers along with the left-over food and vegetable wastes thrown on garbage dumps. This plastic wastes can choke the respiratory system of these animals.
- On burning, plastics releases a lot of poisonous fumes which can cause air pollution.

### **Disposal of Plastic Wastes**

*Disposal of plastic wastes is a major problem.*

- Articles made of plastics are non-biodegradable.
- Burning of plastics releases a lot of poisonous fumes causing air pollution. Sometimes it does not burn completely and may release harmful/poisonous gases into the atmosphere.

### **Measures Taken to Save Environment from Excessive Plastic Wastes**

- Use alternative measures to reduce the use of plastics such as use of cotton cloth bags, jute bags or paper bags.
- Do not throw polythene bags, wrappers of chips, biscuits in public places. These should be thrown in suitable dustbins provided at various public places.
- Reuse the glass containers of jams, pickles, oils and other packed food materials for storing salt, spices, tea-leaves and sugar etc.
- All the plastics wastes should be sent for recycling and new plastic articles should be made.
- 4R's approach can save the environment from the harmful effects of the excessive use of plastics. The acronym 4R's stand for Reduce, Reuse, Recycle and Recover.

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## **Exercise 3.3**

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### **I. Very Short Answer Type Questions (1 Mark)**

1. Give one word for the following:

- (a) Materials which get decomposed easily \_\_\_\_\_
- (b) Materials which does not get decomposed easily \_\_\_\_\_
- (c) Example of a non-biodegradable substance \_\_\_\_\_
- (d) Example of a bio-degradable substance \_\_\_\_\_
- (e) Bio-degradable substances are put in \_\_\_\_\_

2. Fill in the blanks:

- (a) Plastic is not \_\_\_\_\_.
- (b) \_\_\_\_\_ of plastic wastes is a major problem.
- (c) When plastic waste materials are burnt, a lot of \_\_\_\_\_ are released into the atmosphere.
- (d) We should not throw \_\_\_\_\_, so to keep our surroundings clean.
- (e) The use of plastics can be reduced by using bags made up of \_\_\_\_\_.

### **II. Short Answer Type Questions-1 (2 Marks)**

- 3. How does plastic causes air pollution?
  - 4. Classify the following as biodegradable and non-biodegradable substances: woollen clothes, polythene bags, paper, aluminium can, vegetable and fruits peels, cotton cloth, jute bag, electric switch, frying pan handle. (NCERT)
  - 5. State the 4R-principle that we should remember to save the environment.
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#### IV. Short Answer Type Questions-2 (3 Marks)

6. Distinguish between bio-degradable and non-biodegradable substances.
7. Mention two methods to conserve and save our environment.
8. Why is it unhygienic to keep food stuff in recycled plastic.

#### V. Long Answer Type Questions (5 Marks)

9. Avoid use of plastics as far as possible. Comment. (NCERT)
10. Give some solution to problems created by plastics.

### ANSWERS

1. (a) Biodegradable (b) Non-biodegradable  
(c) polyethene  
(d) peels of vegetable, fruits  
(e) green bin
2. (a) biodegradable (b) disposal  
(c) poisonous fumes  
(d) garbage (e) cotton/jute
3. On burning, plastics release a lot of poisonous fumes which causes air pollution. Sometimes plastics are not completely burnt which also causes pollution in the environment.

<i>Biodegradable</i>	<i>Non-biodegradable</i>
Woollen clothes	Polythene bags
Paper	Aluminium cans
Vegetable and fruit peels	Electric switch
Cotton cloth	Frying pan handle
Jute bag	

5. The 4R-principle is reduce, reuse, recycle and recover. As a responsible citizen we should inculcate the 4R-principle.

<i>Biodegradable Substances</i>	<i>Non-Biodegradable Substances</i>
It can be decomposed easily by the action of bacteria.	It cannot be decomposed easily even by the action of bacteria
It decomposes easily within a short period of time.	It takes a long time to decompose sometimes even years.

Example: Peels of vegetables, fruits, cotton cloth, soaps.	Example: Metal, polythene, detergents.
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7. (i) We should avoid the use of plastics. For example - we should not ask for plastic bags when we go for shopping. Instead we should carry cotton or jute bags.
- (ii) We should use two types of bins – a green bin and a blue bin for disposing bio-degradable and non-biodegradable wastes. Biodegradable wastes such as peels of fruits and vegetables, left over food, paper and cotton should be thrown in green bins. Non-biodegradable wastes like plastics, glass etc. should be thrown in the blue bins. This collected plastic is melted and recycled.
8. During recycling of thermoplastics, certain colouring agents are added. These can be carcinogenic. Hence it is unhygienic to keep food-stuff in the recycled plastic.
9. We should develop habits which are environment friendly.
- (i) We should avoid the use of plastics as much as possible. We should not ask for plastic bags when we go for shopping, instead we should carry cotton or jute bags.
- (ii) We should clean and dry plastic bags, plastic containers and plastic disposable bottles for reuse.
- (iii) We should not throw plastic disposable bottles, polybags, wrappers on the road.

- (iv) Never dispose off articles made up of plastic in the sewage system.
10. (i) We should avoid the use of plastics. Instead we should use cotton or jute bags.
- (ii) We should use two types of bins – a green bin and a blue bin for disposing

waste. Biodegradable waste such as peels of fruits and vegetables, left over food, paper and cotton should be thrown in green bin. Non-biodegradable waste like plastics, glass should be thrown in the blue bin. This collected plastic is melted and recycled.

### Did You Know?

- NOMEX is a polymer used in protective clothing for fire-fighters, racing car-drivers, astronauts.
- PET (Polythene teraphthalate) is a familiar form of polyester used for making bottles, in making synthetic clothes, films, utensils and even wires.
- Biodegradable synthetic fibres like NYLON-2 and NYLON-6 are already being made.
- LDPE (low density polythene) is a thermoplastic used for making polybags.

### HOTS & VALUE BASED QUESTIONS

1. Terylene is used for making shirts. Why? **(HOTS)**
  2. The synthetic fibre A is chemically a polyamide whereas the synthetic fibre B contains a large number of ester groups. Another synthetic fibre C is made of a polymer D which consists of a number of glucose units joined one after the other. **(HOTS)**
    - (a) Which fibre could be terylene, rayon and nylon?
    - (b) Name the polymer D.
    - (c) Which fibres is prepared from a natural raw material?
  3. What is the full form of TEFLON. Give its use. **(HOTS)**
  4. Production of synthetic fibres helps in the conservation of forests. Explain. **(HOTS)**
  5. Polybags thrown carelessly are responsible for clogging drains and sewer lines. Explain. **(HOTS)**
  6. How do polyethene affect the respiratory system of animals like cows and buffaloes? **(HOTS)**
  7. Disposal of plastic is a major problem. Discuss. **(HOTS)**
  8. Rahul goes for mountaineering with some selected students of his batch. Initially, he is scared, but his trainer tells him that he should be strong. He provides him a strong rope and teaches him how to climb a mountain.
    - (a) Name the fibre which is used in making the climbing rope.
    - (b) What can we learn from Rahul and his trainer? **(VBQ)**
  9. A lady went to the market to buy a blanket. The shopkeeper showed her blanket made up of acrylic fibres as well as made up of wool. She preferred to buy an acrylic blanket.
    - (a) Why did the lady prefer to buy the acrylic blanket?
    - (b) What values are possessed by the lady? **(VBQ)**
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10. Anshul wants to buy shirts for summer. His friend tells him to buy cotton shirts.  
 (a) Why did his friend tell him to buy a cotton shirt?  
 (b) What values are possessed by his friend? **(VBQ)**
11. Kritika and Shreya went for a picnic in a park. When they had their food, Kritika asked Shreya to put the paper plates, left over food stuff in the green bin, while metal and polyethene bags in the blue bin.  
 (a) Why did Kritika do this?  
 (b) What values are possessed by Kritika? **(VBQ)**

### ANSWERS

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| <p>1. Terylene is lustrous, easy to wash, wrinkle free and dries up quickly.</p> <p>2. (a) B – Terylene<br/>       A – Nylon<br/>       C – Rayon<br/>       (b) D – Cellulose<br/>       (c) Rayon</p> <p>3. Teflon is the brand name of polytetrafluoro ethylene, a type of plastic which is used as a non-stick coating in frying pans.</p> <p>4. Synthetic fibres are manufactured from petrochemicals (obtained from crude oil), so no trees are cut down for making them. Also no raw materials are derived from forests to make synthetic fibres at any stage of production. In this way, synthetic fibres helps in conservation of forests.</p> <p>5. When polybags are carelessly thrown here and there, they block the drain and the sewer lines. Hence, it causes water pollution.</p> <p>6. Sometimes cows and buffaloes eat left over food from the garbage dumps and swallow polythene bags and plastic wrappers. These plastic materials choke their respiratory system or sometimes digestive tract and even cause their death.</p> <p>7. (i) Disposal of plastic wastes lead to the health and environmental hazards.<br/>       (ii) Plastic wastes when burnt, produce toxic gases and smoke causing air pollution.<br/>       (iii) Polybags, wrappers of chips, biscuits</p> | <p>thrown on roads or in packs not only make a place look ugly but also provide breeding ground for many disease - causing germs and insects.</p> <p>(iv) During recycling of thermoplastics, certain colouring agents are added. These can be carcinogenic. Hence it is unhygienic to keep food-stuff in the recycled plastic.</p> <p>8. (a) The rope used for rock-climbing is made up of nylon.<br/>       (b) Rahul is sincere, obedient and dutiful, while his trainer has strong will power, determined and have faith in his students.</p> <p>9. (a) (i) Acrylic is less expensive than natural wool.<br/>       (ii) It is easy to wash and maintain.<br/>       (b) The lady has scientific awareness and practical approach.</p> <p>10. (a) Cotton is a good absorber of sweat, which then evaporates quickly which is followed by cooling.<br/>       (b) His friend has scientific awareness and intelligence.</p> <p>11. (a) Kritika is aware that disposal of plastics is a major problem. She is also aware that plastics can be recycled. All the biodegradable substances are put in green bins and all the non-biodegradable substances are put in blue bins.<br/>       (b) Kritika has scientific awareness, intelligence and she is environment friendly.</p> |
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