Grade : VIII

Lesson 3. Synthetic Fibres and Plastics

SYNTHETIC POLYMERS

Synthetic Fibres

Synthetic fibres like natural fibres are made of very large units called polymers. Polymers are made up of many smaller units are called monomers.

Types of Synthetic Fibres

Rayon

It is made from cellulose obtained from wood pulp.

Uses:

- To make containers, car upholstery, etc
- To make carpets.
- To make surgical dressing.
- To make tyre lands.

Nylon

A Polyamide made from petroleum. It is lightweight, strong and durable. The fabric allows easy evaporation and dries quickly.

Uses:

- Used in women's hosiery and lingerie due to its high elongation and excellent elastic recovery Quality.
- As sportswear, jackets, pants, skirts, raincoats, windbreakers and children wear.
- Used in life vests, umbrellas, sleeping bags and tents.
- In parachutes, flak vests, combat uniforms, tires and other such articles in the armed forces.

Polyester

A versatile and important man-made fabric, it has an outstanding characteristic of resisting wrinkle and springing back into its crisp, smooth shape. It is strong and soft.

Uses:

As dresses, blouses, jackets, sportswear, suits, shirts, pants, rainwear, lingerie, children wear.

Acrylic

A fibre similar to that of wool and is used to make sweater, blankets, shawis, etc. is lightweight, soft and warm. Also it is cheaper than natural wool. It is resistant to chemicals, moths and sunlight. Therefore. They are widely in use nowadays.

Characeristics of Synthetic Fibres

It posses unique characteristics which make them popular dress materials,. They dry up quickly, are durable, less expensive, readily available and easy to maintain.

Plastics

- Like synthetic fibres, plastic is also a polymer. Some plastics have linear arrangement of the units and some have a cross linked arrangement of the units .
- Example : Polythene (Poly- ethane)

Types of Plastics

Thermoplastics

- Gets deformed easily on heating.
- Examples: PVC, polythene.

Thermosetting plastics

- Cannot be bent easily.
- Examples:Bakelite, melamine.

Characeristics of Synthetic Fibres

- Non- Reactive : Not affected by air, water, soil, etc.
- Light, strong and durable: Light, strong and durable and can be moulded into different shapes and sizes,
- Poor Conductors : Do not allow heat and electricity to flow through them.

Effect of Plastics on Environment.

Natural materials like wood and paper are biodegradable (bio= living; degradable = able to be broken down). In contrast, most plastics do not decay, therefore, they are non- biodegradable. The lightweight nature of plastics can also be a problem. Burning of plastics also release poisonous fumes into the atmosphere. This way plastics pollute the environment.

Know the Terms

- **Polymers** : A polymer is an aggregated structure consisting of numerous small simple molecules of one or more kind, called monomers.
- **Cellulose** : It is natural polymer, occurring in the wall of plant cells.
- **Thermoplastics** : Plastics which get deformed easily on heating and can be bent easily are known as thermoplastics. Polythene and PVC are some examples of thermoplastics. These are used for manufacturing toys, combs and various types of containers.
- **Thermosetting plastics** : Plastics which when molded once, cannot be softened by heating are called thermosetting plastics. Bakelite and melamine are examples of thermosetting plastics.
- **Biodegradable** : The material which get decomposed through natural process such as action by bacteria and other microbes like fungi are known as biodegradable materials.
- **Non-Biodegradable** : The materials which are not easily decomposed by natural processes are known as non-biodegradable materials.

Objective Type Questions

(1 Mark each)

I. Multiple Choice Questions

1. Pick the synthetic fibre out of the following.

a. Cotton b. Nylon c. Jute d. Wool

[NCERT Exemplar]

2. Which is a thermosetting plastic?

a. Melamine b. Polythene c. PVC d. Nylon

[NCERT Exemplar]

3. The most suitable material for the preparation of handles of cooking utensils is

a. Polythene b. PVC c. Nylon d. Bakelite

[NCERT Exemplar]

4. The material which is commonly used for making kitchen container is **[NCERT Exemplar]**

a. PVC b. Acrylic c. Teflon d. PET

5. Which of the following represents the correct match for items in Column A with those in Column B? **[NCERT Exemplar]**

Column A	Column B
a. Nylon	i. Thermoplastic
b. PVC	ii. Thermosetting plastic
c. Bakelite	iii. Fibre

Codes:

a. a. i, b. iii, c. i b. a. iii, b. i, c. ii c. a. ii, b. i, c. iii d. a. iii, b. ii, c. i

6. Rayon is obtained by

a. Petroleum products b. Fully synthetic method

c. Chemical treatment of wood pulp d. All methods

7. Which is not made from nylon?

a. Socks b. Rope c. Bottle d. Tents

8. The strongest fibre is called

a. Rayon b. Nylon c. Acrylic d. None of these

9. The polyester is made up of

a. Nylon b. Rayon c. Esters d. Cotton

10. The raw materials(s) used in making nylon is / are.

a. Wood pulp b. Cellulose c. Coal, water, air d. All of these

11. Which is an example of plastic?

a. Wood pulp b. Polythene c. Cotton d. None of these

12. Which is not a property of plastic?

a. Biodegradable b. Light c. Strong d. Durable

13. Fireproof plastic used in the uniform of fireman is

a. Teflon b. Melamine c. Bakelite d. All of these

1. b	2. a	3. d	4. d	5. b	6. c	7. c
8. b	9. c	10. c	11. b	12. a	13. b	

II. Multiple Choice Questions

1. Fabric is made of

a. Steel b. Fibre c. Paper d. None of these

2. The small units used for making synthetic fibres are

a. Molecules b. Polymers c. Cells d. None of these

3. The strongest fibre among the following fibre is

a. Rayon b. Nylon c. Acrylic d. None of these

4. The first man-made fibre is

a. Nylon b. Polyester c. Rayon d. Cotton

5. Plastics which do not remould again on heating are

a. Thermosetting plastics b. Thermoplastics

c. Both of these d. None of these

6. Polyester is made up of

a. Nylon b. Rayon c. Esters d. Cotton

7. Nylon was prepared first in

a. 1921 b. 1931 c. 1941 d. 1951

8. The fibre made by the chemical treatment of wood pulp is

a. Rayon b. Nylon c. Polyester d. None of these

9. Synthetic fibre which works like wool is

a. Nylon b. Polyester c. Acrylic d. PVC

10. The raw materials used for making nylon

a. Wood pulp b. Cellulose c. Coal, water, air d. All of these

1. b	2. a	3. b	4. c	5. a	6. c	7. c	8. a	9. c	10. c

I. Fill in the blanks

1. The synthetic fibres are also known as _____ fibre. **[NCERT Exemplar]**

2. A fibre similar to wool is _____.

3. Cellulose is made of a large number of _____.

4. A fibre obtained by chemical treatment of wood pulp is called _____ or _____ .

5. _____ was prepared from coal, water and air.

6. Nylon thread is stronger than _____.

7. Rayon is mixed with cotton to make _____ or mixed with wool to make _____.

8. The fibres that are made by human beings, are called _____ or _____ fibres.

9. _____ is quite suitable for making dress material.

10. _____ and _____ are some of the examples of thermoplastics.

11. Plastic does not react with _____ and _____.

12. Plastic is a _____ substance since it takes several years to decompose.

1. man-made	2. Rayon	3. glucose units
4. rayon or artificial silk	5. Nylon	6. steel wire
7. bed sheets/ carpets	8. synthetic, man-made	9. Terylene
10. Polythene, PVC	11. moisture, air	12. non-biodegradable

II. Fill in the blanks

1. We get natural fibres from _____ and animals.

2. Cotton is the polymer of _____.

3. We should avoid using _____ carry bags.

4. Say 'no' to _____ and say 'yes' to _____ bags.

5. Switch boards and electric plugs are made of _____.

6. Nylon was first prepared in the year _____.

7. Raw material used for making rayon is _____.

8. Cotton and jute are _____ fibres.

9. Rayon is called artificial _____.

10. Nylon was prepared from water , air and _____.

1. Plants	2. Cellulose	3. Polythene	4. Polythene bags, paper	5. Bakelite
6. 1931	7. Wood pulp	8. Natural	9. silk	10. Coal

I. Match the following

I. Column A		Column B	
(i)	Polythene	(a)	Natural polymer
(ii)	Polymers	(b)	Small units for making fibre
(iii)	Cotton	(c)	Bad conductor of heat and electricity
(iv)	Plastics	(d)	Fibre obtained from moth
(v)	Silk	(e)	Choke respiratory system

(i). (e)	(ii). (b)	(iii) . (a)	(iv) . (c)	(v) . (d)

II. Column A		Column B	
(i)	Cotton	(a)	Synthetic fibre
(ii)	1931	(b)	Fibres
(iii)	Rayon	(c)	Thermoplastic
(iv)	Fabrics	(d)	Natural fibre
(v)	PVC	(e)	Nylon

(i). (d)	(ii). (e)	(iii) . (a)	(iv) . (b)	(v) . (c)

II. Match the following.

I. Column I	Column II
1. Polymer	i. First fully synthetic fibre
2. Rayon	ii. Woollen synthetic fibre
3. Nylon	iii. Gets deformed easily
4. Polyester	iv. Non bio-degradable
5. Terylene	v. Cannot be softened by heating
6. Acrylic	vi. Artificial silk
7. Petrochemicals	vii. Large single chemical unit

8. Polywool	viii. Fibre does not wrinkle easily
9. Thermoplastic	ix. Petroleum origin
10. Thermosetting	x. Can be drawn into fine Plastic fibre
11. Plastic bags	xi. Mixture of polyester and wool

1. vii	2. vi	3. i	4. viii	5. x	6. ii	7. ix	8. xi	9. iii	10. v	11. iv

II. Column I	**Column II**
1. Nylon	i. Non-stick coating
2. PET	ii. Electric switches
3. Thermosetting	iii. Parachutes
4. Teflon	iv. Polyester
5. Acrylic	v. Artificial wool

1. iii	2. iv	3. ii	4. i	5. v

I. True or False

1. The fabric terry wool is obtained by mixing Terylene and wool.
2. Most of the plastics are biodegradable.
3. Acrylic is an artificial wool.
4. Plastics are light, strong and durable.
5. Synthetic fibre does not melt on heating.
6. A synthetic fibre is a chemical substance of single unit.
7. Rayon is the fully synthetic fibre.
8. We should not wear synthetic clothes while cooking in the kitchen or in a laboratory.

1. True	2. False	3. True	4. True	5. False	6. False	7. False	8. True

II. True or False

1. Polyester is a natural fibre.
2. Cotton is the polymer of cellulose.
3. We should use more and more polythene bags.
4. Silk is the most expensive natural fibre.
5. We get natural fibres from plants and animals.
6. Acrylic is a synthetic fibre which works like wool.
7. Nylon was made first in 1931.
8. Rayon was prepared by coal, water and air.
9. Cotton and jute are the two common synthetic fibres.
10. PVC is a thermosetting plastic.

1. False	2. True	3. False	4. True	5. True	6. True	7. True	8. False	9. False	10.False

Quiz Time

1. Name a single large unit which is formed by the combination of a large number of small repeating units.

2. Which fibre is commonly known as artificial silk?

3. In which year nylon was first made?

4. Name a man-made fibre which was formed without using natural raw material.

5. What do 5 R's stand for?

6. What is the small repeating unit called, which is used to form polyester?

7. How many types of plastics are there, on the basis of arrangement of units?

8. My mother always buys PET jars for storing rice and sugar. I wonder what PET is?

9. What is the source of raw materials used to prepare all the synthetic fibres?

10. Which plastic is used for non-stick coating on cookwares?

Answers:

1. Polymer
2. Rayon
3. In 1931
4. Nylon

5. 4 R's stand for : Reduce , Reuse, Recycle and Recover

6. Ester

7. There are two types of plastics: (i) Linear-linked (ii) Cross-linked

8. PET is polyethylene terapht halate. It is a very familiar form of polyester

9. Petrochemicals of petroleum origin

10. Teflon

NCERT Corner

Intext Questions

1. Boojho asked : Is nylon fibre really so strong, that we can make nylon parachutes and ropes for rock climbing?

Yes, a nylon wire is stronger than steel wire.

2. Paheli : My mother always buys PET water bottles and PET jars for storing rice and sugar. I wonder what PET is?

PET (Poly Ethylene Terephthalate) is a form of polyester which is light in weight, strong, cheap and poor conductor of heat and electricity, so it is used to make jars for storing rice and sugar. They also do not get wrinkled easily and remain crisp and are easy to wash.

3 What are the properties of nylon?

Nylon is a synthetic fibrous material that is known for its high tensile strength, abrasion resistance and chemical stability. It is a very resilient fibre that is often used to make cords and ropes that need to support a lot of weight and withstand wet, hot or dry conditions. When used in clothing, nylon is both light weight and warm.

4. Why should one never wear polyester clothes while working in kitchen?

We should never wear polyester clothes or synthetic clothes while working in kitchen because synthetic fibres melt on heating. If the clothes catch fire, it can be disastrous. The fabric melts and sticks to the body of the person wearing it.

Textbook Questions

1. Explain why some fibres are called synthetic.

Some fibres are manufactured by using different chemical processes and are made by human beings. The raw materials for manufacturing synthetic fibres are obtained from petroleum origin called petrochemicals. So, some fibres are called synthetic fibres or artificial fibres.

2. Mark (✓) the correct answer. Rayon is different from synthetic fibres because :

(i) It has silk- like appearance.

(ii) It is obtained from wood pulp.

(iii) Its fibres can also be woven like those of natural fibres.

(i) It is obtained from wood pulp.

3. Fill in the blank spaces with appropriate words :

(i) The synthetic fibres are also called _____ or _____fibres.

(ii) Synthetic fibres are synthesized from raw material called_____.

(iii) Like synthetic fibres, plastic is also a _____.

(i) Man-made, artificial

(ii) Petrochemicals

(iii) Polymer

4. Give examples which indicate that nylon fibres are very strong.

Nylon is used for making parachutes and ropes for rock climbing which bear large weights of articles or human beings. These articles indicate the strength of nylon.

5. Explain why plastic containers are favoured for storing food.

Following are the advantages of plastic containers:

(i) Plastics are available in all possible shapes and sizes.

(ii) Plastic containers can be reused.

(iii) They are bad conductors of heat and electricity, so they preserve the food from outer climate for long time.

(iv) Plastic is non reactive and food items have different chemicals, so they are contained in plastic wares.

(v) Plastic is light, strong and durable.

6. Explain the difference between the thermoplastics and thermosetting plastics.

Differences between thermoplastics and thermosetting plastics are as follows :

S. No	Thermoplastics	Thermosetting plastics
i.	(i) These are the plastics which get deformed easily on heating, e.g., Polythene and PVC.	These are plastics, which when molded once, cannot be softened by heating e.g., Bakelite and melamine.
ii.	(ii) These are used for making toys, combs, various types of containers etc.	In thermosetting plastics, bakelites are used for making electrical switches, handles of various utensils, etc. Melamines are used for making floor tiles, kitchen wares and fabrics which resist fire.

7. Explain why the following are made of thermosetting plastics :

(a) Saucepan handles

(b) Electric plugs/ switches/ plug boards

Thermosetting plastic as melamine resists fire and can tolerate heat better than other plastics, so it is used for making saucepan handles. Thermosetting plastic as bakelite, is a poor conductor of electricity and also heat resistant, so it is used for making electrical switches, plugs and plug boards.

8. Categorize the following materials into 'can be recycled' and 'cannot be recycled'.

Telephone instruments, toys, cooker handles, carry bags, ball point pens, plastic bowls, electric wire covering, plastic chairs and electrical switches.

Most of the thermoplastic plastics can be recycled, so based on this fact the given materials are categorized as follows :

Can be recycled : Toys, carry bags, ball point pens, plastic bowls, electric wire covering.

Cannot be recycled : Telephone instruments, cooker handles, plastic chairs, and electrical switches.

9. Rama wants to buy shirts for summer. Should he buy cotton shirts or shirts made from synthetic materials? Advise Rama, giving your reason.

The cotton clothes are natural fibres and absorb more water than synthetic fibres. The synthetic fibres are bad conductors of heat and resist the heat of body to transfer into climate. The cotton clothes also absorb sweat of body easily, that is why cotton clothes are preferred in summer.

10. Give few examples to show that plastics are non-corrosive in nature.

Corrosion of a substance is the process of reaction with water or moisture of air and getting damaged. Following are the few examples :

(i) We use buckets and mugs made up of plastics in our bathrooms regularly, but they remain as it is for long time period.

(ii) Plastics do not decompose in atmosphere for long period.

(iii) Many health care products such as packaging of tablets, threads used for stitching wounds, remain in their original look for long time period.

11. Should the handle and bristles of a tooth brush be made of the same material? Explain your answer.

No, handle and bristles of a tooth brush should be made of different materials because the handle must be hard and strong for handling, so they are made up of thermosetting plastics and bristles are used inside the mouth so they must be light and soft so that they do not damage the teeth and other organs. Therefore, bristles are made up of thermoplastic.

12. 'Avoid plastics as far as possible'. Comment on this advice.

The waste created by plastics is not environment friendly. On burning, plastics release poisonous gases. On dumping in the ground they may take years to degenerate due to their non-biodegradable nature. So avoid use of plastics as far as possible.

13. Match the terms of column A correctly with the phrases given in column B.

Column I	Column II
(i) Polyester	(a) Prepared by using wood pulp
(ii) Teflon	(b) Used for making parachutes and stockings
(iii) Rayon	(c) Used to make non-stick cookwares
(iv) Nylon	(d) Fabrics do not wrinkle easily

(i) (d)	(ii) (c)	(iii) (a)	(iv) (b)

14. 'Manufacturing synthetic fibres is actually helping conservation of forests'. Comment.

Synthetic fibres are manufactured by raw materials found from petroleum origin called petrochemicals while natural fibres involve the raw materials found from natural sources and forest. So, in manufacturing of synthetic fibres the raw materials of forest origin are not involved. So, the manufacturing of synthetic fibres helps conservation of forests.

15. Describe an activity to show that thermoplastic is a poor conductor of electricity.

Take an electric switch made up of thermosetting Plastic and make the proper connections of electricity in points provided in switch. Now press the switch in ON/OFF position. It is observed that we do not get any shock, which indicates that thermoplastics are poor conductor of electricity.

I. Very Short Answer Type Questions

1. What are clothes made up of?

The clothes we wear are made of fabrics.

2. What are fabrics made up of?

The fabrics are made of fibres.

3. How many types of sources of fibre are there?

There are two types of sources of fibres;

(i) Natural sources (ii) Artificial sources

4. What are natural fibres?

The fibres obtained from plants or animals are called natural fibres.

5. Give two examples of natural fibres.

(i) Cotton (ii) Jute

6. What are synthetic fibres?

The fibres made by human beings are called synthetic or man-made fibres.

7. Name two man- made fibres.

(i) Nylon (ii) Rayon

8. What are polymers?

When a large number of small units combine to form a single large unit, then the large unit is called polymer.

9. What is the meaning of the word polymer?

Polymer consists of two words, poly and mer. Poly means many and mer means repeating units.

10. Name a natural polymer.

Cellulose

11. What are the units of cellulose?

Glucose

12. Name the fibre having properties similar to that of silk.

Rayon

13. What is the common name of rayon?

Rayon is known as artificial silk

14. How is rayon obtained?

Rayon is obtained by chemical treatment of wood pulp.

15. Name a man-made fibre which is made without using natural raw materials.

Nylon

16. When was nylon first prepared?

Nylon was made in 1931.

17. What are the raw materials used in making nylon?

Nylon is prepared from coal, water and air.

18. Which is the first fully synthetic fibre?

Nylon.

19. Name two articles made by rayon.

Socks and tents.

20. Write the names of two articles made by nylon.

Parachutes and ropes for rock climbing.

21. Name a polyester which is commonly used.

Terylene is a popular polyester.

22. What is polyester?

The polymer made up of the repeating units of ester.

23. Which is more stronger, steel wire or a nylon wire?

Nylon wire.

24. Name a synthetic fibre which works like wool.

Acrylic

25. What are petrochemicals?

The synthetic materials formed by using petroleum as raw material, are called petrochemicals.

26. What are plastics?

A plastic is a polymer like a synthetic fibres, but is can be moulded.

27. Name the types of arrangement of units found in plastics?

There are two types of arrangement of units in plastics;

(i) Linear linking (ii) Cross linking

28. Name two types of plastics.

(i) Thermoplastics (ii) Thermosetting plastics

29. Give two examples of thermoplastics.

Polythene and PVC

30. What is the full form of PVC?

PVC stands for Poly Vinyl Chloride.

31. Name two thermosetting plastics.

Bakelite and Melamine

32. Why plastics are not ecofriendly?

Plastics are non-biodegrable and take several years to decay, so they not eco-friendly.

33. What is 5R principle?

5Rs stand for Reduce, Reuse, Recycle Recover and refuse.

34. How many fibres are there?

There are two types of fibres;

(i) Synthetic fibres (Man-made) (ii) Natural fibres

35. Which types of fibre are stronger and more durable?

Synthetic fibres are strong and more durable.

36. What is the similarity in synthetic and natural fibres?

Both are made up of long chains of small units.

37. What is Polywool?

Polywool is a mixture of polyester and wool.

II. Very Short Answer Type Questions

1. Terrycot is made by mixing two types of fibres. Write the names of the fibres.

Terrycot is made by mixing terylene and cotton.

2. Define cellulose.

Cellulose is made up of a large number of glucose units.

3. What are artificial fibres?

The fibres made by human beings are called artificial fibres e.g., polyester.

4. How is rayon formed?

Rayon is obtained by chemical treatment of wood pulp.

5. Name any two thermoplastic and thermosetting plastics.

(i) Thermoplastic — Polythene, PVC

(ii) Thermosetting plastics — Melamine, Bakelite

6. Name the material that is used to make ropes for rock climbing.

Nylon.

7. Name the articles made from PET.

Bottles, utensils, films, wires etc.

8. What is the versatility about melamine?

It resists fire and can tolerate heat better than plastic.

9. Name the unit used in the formation of a polymer.

Monomer is the small unit used in the formation of polymer.

10. Why is it not advisable to burn plastic and synthetic fabrics?

Burning of plastics and synthetic fabrics produces lots of poisonous gases causing air pollution.

III. Very Short Answer Type Questions.

1. Cotton is a natural polymer. What is its chemical name?

Cellulose

2. A synthetic fibre which looks like silk is obtained by chemical treatment of wood pulp. It is, therefore, known as artificial silk. What is its common name?

Rayon

3. Terycot is made by mixing two types of fibres. Write the name of the fibres.

Terylene and cotton

4. Plastic articles are available in all possible shapes and sizes. Can you tell why?

Plastic is easily moldable so the articles can be made in any shape and size.

5. Plastic is used for making a large variety of articles of daily use and these articles are vary attractive. But it is advised to avoid the use of plastic as far as possible. Why?

Due to non-biodegradable nature it causes environmental pollution.

6. Why is it not advisable to burn plastic and synthetic fabrics?

Burning of plastic and synthetic fabrics produce lots of poisonous gases causing air pollution.

7. Select the articles from the following list which are biodegradable.

a. Paper **b. Woollen clothes**

c. Wood **d. Aluminum can**

e. Plastic bag **f. Peels of vegetables**

a,b,c and f

8. A bucket made of plastic does not rust like a bucket made of iron. Why?

Plastic is a non-reactive material. It does not react with air and water and thus does not rust.

9. Why rayon is called artificial silk?

Rayon fibres has shine like silk in appearance, therefore it is called artificial silk.

10. What is PET?

It is a very familiar form of polyester. The full form of PET is Poly- Ethylene terephthalate.

11. What is meant by the 4R's Principle?

The 4R's stand for: Reduce, Reuse, Recycle and Recover.

I. Short Answer Type Questions.

1. Rohit took with him some nylon ropes, when he was going for rock climbing. Can you tell why he selected nylon ropes instead of ropes made of cotton or jute?

Nylon ropes are strong, elastic and lighter as compared to cotton and jute ropes.

2. A lady went to the market to buy a blanket. The shopkeeper showed her blankets made of acrylic fibres as well as made of wool. She preferred to buy an acrylic blanket. Can you guess why?

Acrylic blankets are cheap, light in weight, more durable and are available in variety of colours andand designs. They can be easily washed at home.

3. PVC (Ploy vinyl chloride) is a thermoplastic and is used for making toys, chappals, etc. Bakelite is a thermosetting plastic and is used for making electrical switches, handles of various utensils, etc. can you write the major difference between these two types of plastics?

Thermoplastics get deformed easily on heating and can be bent easily on heating on the other hand, thermosetting plastics when molded once cannot be softened on heating.

4. Why should one never wear polyster clothes while working in the kitchen?

Polyster clothes are synthetic fibre and melt on heating. If the clothes catch fire, it can be disastrous, the fabric fibre and melt on heating. If the clothes catch fire, it can be disastrous, the fabric melts and sticks to the body, so, one should never wear synthetic clothes while working in the kitchen.

5. Discuses the characteristic properties of plastics.

a. plastic is non-reactive

b. Plastic is light, strong and durable.

c. Plastics are poor conductor

II. Short Answer Type Questions.

1. Name five articles. Write the type of fibre used?

(i) Coconut rope : Natural fibre

(ii) Cotton clothes : Natural fibre

(iii) Polyester clothes : Synthetic fibres

(iv) Basket : Synthetic fibre

(v) Parachute : Synthetic fibre

2. What are synthetic fibres? Give two examples.

A synthetic fibre is a chain of small units joined together like necklace beads. Each small unit actually a chemical substance. Example: Rayon and Nylon

3. What is rayon? Why is it called artificial silk?

Rayon is synthetic fibre having properties similar to that of silk. So it is called artificial silk. It is obtained by chemical treatment of wood pulp.

4. What are the uses of rayon?

Rayon is a manmade fibre. It resembles silk, but it is cheaper than silk. It is mixed with cotton to make bed sheets or mixed with wool to make carpets.

5. What are the properties of nylon?

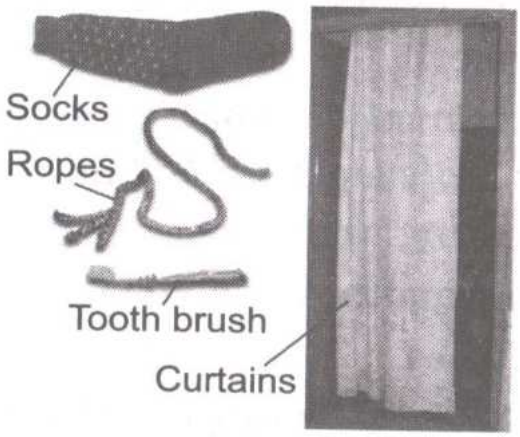
(i) Nylon fibres are strong

(ii) They are elastic and light

(iii) They are easy to wash and lustrous.

6. What are the uses of nylon?

Nylon fibres are used to make many articles, such as socks, ropes, tents, toothbrushes, car seat belt , sleeping bags, curtains, etc. It is also used to make parachutes and ropes for rock climbing.



7. Why is polyester suitable for making dress materials?

Polyester is a synthetic fibre which is quite suitable to make dresses and other clothes due to its properties. It does not wrinkle easily. It remains crisp and easy to wash. It is light and durable. It takes very little time to dry.

8. What are the raw materials used in making polyester?

Polyester is made up of repeating units of chemicals called ester. Esters are the chemicals which have fruity smell. The fabrics are sold by the names like polycot, polywool and terrycot.

9. What are the qualities of synthetic fibres make them more popular than natural fibres?

The following properties make synthetic fibres more popular;

(i) They are cheaper than natural fibres.

(ii) They are available in variety of colours.

(iii) They are more durable and affordable than natural fibres.

10. What is 5R principle?

5R stands for:

(i) Reduce : We should reduce using non-biodegradable things.

(ii) Reuse : We should use things again and again.

(iii) Recycle : We should use the things which can be recycled.

(iv) Recover : Try to recover the usable things.

(v) Refuse : We should not use disposable plastics as they are the greatest source of plastic pollution.

11. What is plastic? Why is it used in a variety?

Plastic is a polymer. It can be moulded in any shape. Plastic can be recycled, reused, coloured, melted, rolled into sheets or made into wires. That is why it finds such a variety of uses.

12. Why is convenient to store food in plastic containers than metals?

Plastic containers seem more convenient to store food, than metal containers, because of light weight, lower price, good strength and easy handling.

13. Why are plastics used widely in the industries and household articles?

Plastics are light weight, strong, durable and easily mouldable into different shapes and sizes. They are generally cheaper than metals and are bad conducter of heat and electricity. This is why, they are widely used in industries and household articles.

14. Write the uses if plastics in health care industry.

Plastics find extensive uses in health care industry. Some examples of their uses are packaging of tablets, threads used for stitching wounds, syringes, doctor's gloves and a number of medical instruments.

15. Write some uses of plastics based on the poor conductivity of heat and electricity.

Based on poor conductivities of heat and electricity, plastics are used as covering for electrical wires and in manufacture of handles of screw drivers and frying pans.

16. What are biodegradable and non-biodegradable materials? Explain with examples.

Biodegradable materials : A material, which decompose through natural process, such as action by microorganisms, is called as biodegradable material. For example, paper, leaves, vegetable , fruits, etc.

Non-biodegradable materials : A material, which is not easily decomposed by natural processes, such as action of microorganisms, is called non-biodegradable material. For example, glass, copper, plastics, synthetic fibres, etc.

17. Write disadvantages of plastics.

Plastics take several years to decompose, so they are not environment-friendly. Plastic causes environmental pollution; besides, the burning process of synthetic materials is quite slow and it does not burnt completely. In this way, it releases lot of poisonous fumes in the atmosphere causing air pollution.

18. Say 'no' to polythene bags and say 'yes' to paper bags. Comment on this slogan.

When we use polythene bags and throw them here and there, they are eaten by the animals like cows. These materials choke the respiratory system of animals or form a lining in their stomach that may lead to their death.

Polythene bags are also responsible for clogging the drains. So, we should say 'no' to polythene bags and say 'yes' to paper bags.

III. Short Answer Type Questions - I

1. Why is nylon fibre becoming very popular for making clothes?

Nylon fibre is strong, elastic, light and water resistant. It is lustrous and easy to wash. Thus it is becoming very popular for making clothes.

2. Name five articles made from nylon.

Articles made from nylon are socks, ropes, tents, toothbrushes, car seat belts, sleeping bags etc.

3. Why is nylon used for making parachutes and ropes for rock climbing?

Nylon thread is stronger than a steel wire.

4. What is polyester?

Polyester is actually made up of the repeating units of a chemical called ester.

5. Why is acrylic more popular than natural woollen fibres?

Acrylic is available in a variety of colours, more durable and affordable which makes it more popular than natural woollen fibres.

6. What are petrochemicals?

All synthetic fibres are prepared by a number of processes using raw materials of petroleum origin, called petrochemicals.

7. Which are the unique characteristics possessed by synthetic fibres?

Synthetic fibres are more durable and affordable, available in a variety of colours, making them unique.

8. When we add hot water in a plastic bottle, it gets deformed. What kind of plastic is it? Give two more examples.

It is thermoplastic. Two examples are polythene, PVC.

9. Plastic is used for making a large variety of articles of daily use and these articles are very attractive. But it is advised to avoid the use of plastic as far as possible. Why?

Plastic is non-biodegradable; it takes several years to decompose. Thus, it causes environmental pollution. So, we should avoid use of plastics.

10. Write any two properties of nylon.

(i) Nylon fibres are strong, elastic and light

(ii) They are easy to wash and lustrous.

III. Short Answer Type Questions- II

1. What are the disadvantages of synthetic fibres?

Disadvantages of synthetic fibres are :

(i) It melts on heating.

(ii) Its clothes catch fire easily

(iii) It melts and sticks to the body of the person wearing it, when it is heated.

2. Take two cloth pieces of the same size, one from natural fibre and another from synthetic fibre. Soak them in different mugs containing same amount of water. After five minutes spread them in the Sun.

Observe and answer the following :

(i) How much water is soaked by both fibres?

(ii) Which fibre soaks more water?

(iii) Which fibre dries quickly?

(i) Synthetic fibre soaks less water, whereas natural fibre soaks more water.

(ii) Natural fibre.

(iii) Synthetic fibre.

3. What are thermosetting plastics? Write two examples with their characteristics.

There are some plastics which when moulded once, cannot be softened by heating. These are called thermosetting plastics e.g., Bakelite and melamine.

Bakelite : It is poor conductor of heat and light.

Melamine : It is fire resistant.

4. Why do plastic containers seem most convenient?

Plastic containers seem most convenient because of their light weight, lower price, good strength and easy handling.

5. How can we say that plastic is non-reactive?

When plastic is left exposed to moisture and air it is not corroded easily. So they are non-reactive.

6. Write any three positive characteristics of plastic.

Plastic is very strong, light and durable. It can be moulded into different shapes and sizes. It is used for various purposes. Plastics are generally cheaper than metals. They are widely used in industry and for household articles.

7. What is Teflon?

Teflon is a special plastic on which oil and water do not stick. It is used for nonstick coating on cook-wares.

8. Arrange the following wastes as biodegradable and non-biodegradable. Peel of vegetables and fruits, leftover food stuff, paper, cotton cloth, wood, woollen clothes, Tin, aluminium and plastic bags.

Biodegradable : Peel of vegetables and fruits, leftover food stuff, paper, cotton cloth, wood and woollen clothes.

Non-biodegradable : Tin, aluminium, plastic bags.

9. What is 4R principle?

The 4R principle means Reduce, Reuse, Recycle and Recover. One should develop these habits, which are environment friendly.

I. Long Answer Type Questions.

1. Plastic is not environment friendly. Explain.

Plastic is non-biodegradable substance, so it cannot be decomposed. It is creating a great problem for environment. While burning it gives lots of poisonous gases and takes a long time to degrade. This pollution is a major threat to our environment.

(i) Polythene bags are also a big threat to our environment.

They are non-biodegradable substances. When people throw peels of vegetables and left over food items in plastic bags they are eaten by animals such as cows. The plastic material chokes the respiratory system of these animals or forms a lining in their stomach and can be the cause of their death.

(ii) The polybags carelessly thrown here and there are responsible for clogging the drains. Carelessly the wrappers of chips, biscuits etc. are thrown here and there on picnic spots and roads which all create pollution in our environment.

(iii) Plastic waste when dumped in water causes water pollution. Aquatic animals consume these plastics and die. Hence, the plastics are not environment friendly.

2. 'Plastic as material of choice'. Explain with suitable examples.

Plastic is a material of choice. It is also a polymer like the synthetic fibre. It can be used easily as follows :

(i) Plastic is easily moulded i.e., can be shaped in any form. It can be recycled, reused, coloured, melted, rolled into sheets or made into wires.

(ii) Plastics are strong, light weight and durable. Plastic containers seem to be the most convenient. They are easy to carry.

(iii) Plastics are non-reactive as these are not affected by chemicals, they do not corrode but melt upon heating.

(iv) Plastics are poor conductors of heat and electricity. Hence they are widely used in electric wire coating,

plastic covering, handles of screw drivers, handles of frying pans and also to form non-sticking cook wares.

(v) Fire-proof plastics are also used in the uniforms of firemen. They have coating of melamine plastic to make them flame resistant.

3. Despite being very useful, it is advised to restrict the use of plastic. Why is it so? Can you suggest some methods to limit its consumption? (NCERT Exemplar)

Plastic is non-biodegradable and causes environmental pollution as it takes several years to decompose. It is not environment friendly. When the plastic waste materials are burnt, they burn very slow. They do not get completely burnt. In the burning process, they release lots of poisonous fumes (gases) into the atmosphere causing air pollution. The animals eat up the polythene bags and wrappers of food along with the leftover food thrown on garbage dumps.

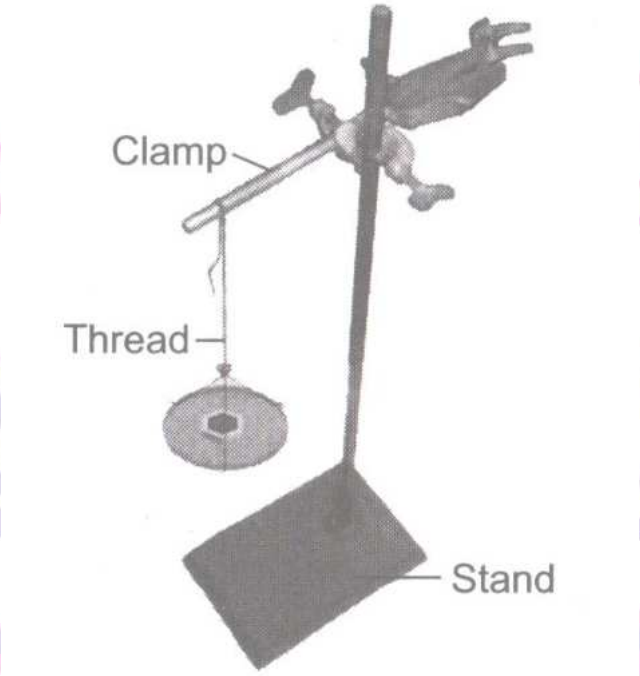
The methods to limit its consumption are : Reducing its use; reusing it for some other purposes and recycling. It may reduce environmental pollution also.

II. Long Answer Type Questions.

1. Explain with the help of an activity that nylon thread is stronger than cotton, wool, silk and nylon.

Take an iron stand with a clamp. Take a cotton thread of about 60 cm length. Tie it to the clamp, so that it hands freely from it, as shown in figure 3.4. At the free end , suspend a pan, so that weight can be placed on it. Add weight one by one till the thread breaks. Note the

total weight require to break the thread. Repeat the same activity with threads of wool, silk and nylon. We observe that more weight is required to break the nylon thread, as composed to other threads. So we can say that nylon is stronger than other threads.



2. Write the characteristics of synthetic fibres.

Characteristics of synthetic fibres:

(i) They dry up quickly

(ii) They are durable

(iii) They are cheap

(iv) They are readily available

(v) They are easy to maintain

(vi) They are strong and light

(vii) They soak less water

(viii) They are not attacked by microorganisms

3. Make a table to show various types of wastes, time taken to degenerate and their nature.

Types of Waste	Approximate Time taken to Degenerate	Nature of Material
Peels of vegetable and fruits, leftover foodstuff etc.	1 to 2 weeks	Biodegradable
Paper	10 to 30 days	Biodegradable

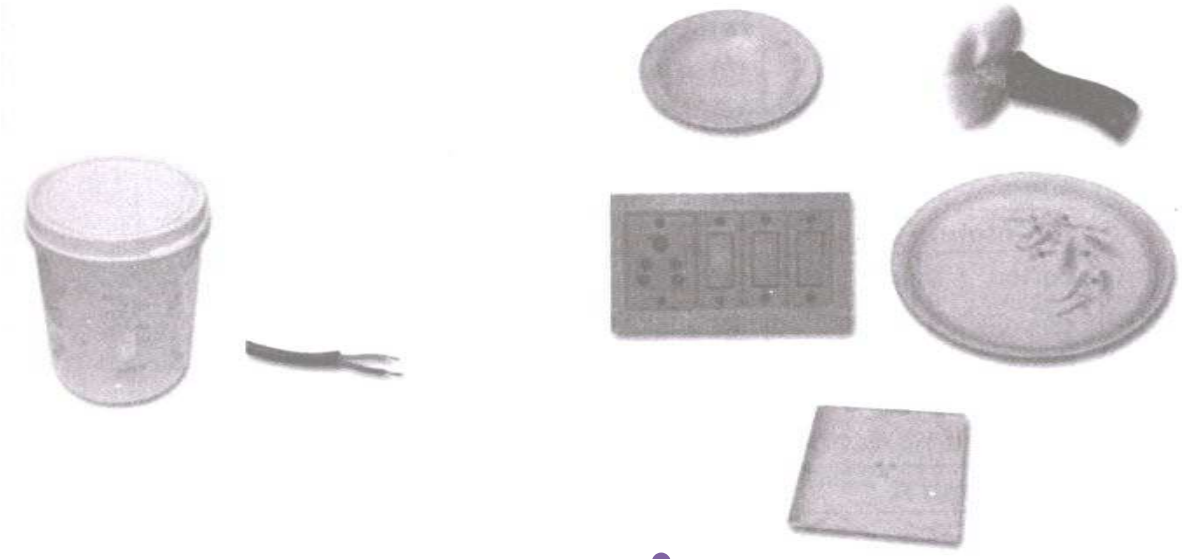
Cotton cloth	2 to 5 months	Biodegradable
Wood	10 to 15 years	Biodegradable
Woollen clothes	About a year	Biodegradable
Tin , aluminium, and other metal cans	100 to 500 years	Non-biodegradable
Plastic bags	Several years	Non-biodegradable

4. Explain thermoplastic and thermosetting plastics with examples.

There are two type of plastics: (i) Thermoplastics (ii) Thermosetting plastics

(i) Thermoplastics : The plastics which deform easily on heating and can be bent easily are known as thermoplastics. Polythene and PVC are some examples.

(ii) Thermosetting Plastics : The plastics which when once moulded, cannot be softened again by heating are called thermosetting plastics. Bakelite and Melamine are two common examples. Bakelite is used in making electrical switches, handles of various utensils. Melamine is used for making floor tiles, kitchenware and fabrics which resist fire.



III. Long Answer Type Questions.

1. Write the importance of synthetic polymers in our life.

Synthetic fibres are important in our life because of multiple uses. Nylon

a. Nylon is widely used in women's hosiery and lingerie. It is used in carpeting materials and upholstery fabrics because it is easy to clean.

b. The fabric is also used in life vests, umbrellas, sleeping bags and tents.

c. As industrial product, nylon fabric is used as seat belts, tire cords, ballistic cloth and good elasticity.

Acrylic

It is used to make sweater, blankets, shawls, etc.

Rayon

a. Rayon is used to make containers. Car upholstery, etc.

b. It is used to make carpets, tyre lands.

c. It is used to make surgical dressings.

PET

PET is used to make bottles, utensils, films, wires, etc.

2. Despite being very useful it is advised to restrict the use of plastic. Why is it so? Can you suggest some methods to limit its consumption?

Plastic is a non- biodegradable material and as such it causes land pollution. At the same time burning such materials in the form of garbage causes serious air pollution. Some ways to limit its consumption are:

a. Reducing the use of plastics. Whenever possible use paper bags instead of plastic bags.

b. Reusing it for some other purpose thereby decreasing its consumption.

c. Recycling of plastic. It requires the plastic to be collected, sorted, chopped, melted and remoulded.

3. Write an activity to show that synthetic fibres are stronger than the cotton fibres.

Activity :

- Take an iron stand with a clamp and a cotton thread of about 65 cm length.
- Tie the thread to the clamp so that it hangs freely as shown in figure.
- At the free end suspend a pan so that weight can be placed it.
- Add weight one by one till the thread breaks.
- Note down the total weight required to break the thread. This indicates the strength of the fibre.

- Repeat the same activity with threads of wool, silk and nylon is more than cotton. So, synthetic fibres are stronger than cotton.

You will observe that the weight required breaking the threads of wool, silk and nylon is more than cotton. So, synthetic fibres ar stronger than cotton.

4. Distinguish between natural fibres and synthetic fibres.

S.NO	Natural fibres	Synthetic Fibres
i	These fibres are naturally obtained from plants and animals.	These fibres are made by man in factories.
ii	For example, cotton, silk, etc	For example, rayon, polyester, etc.

I. High Order Thinking Skills (HOTS) Questions

1. Name the plastic, which is coated on the uniforms of firemen to make them fire resistant.

Melamine (a thermosetting plastic) is coated on the uniforms of firemen.

2. Which synthetic fibre contains the organic group similar to those which give fruits their sweet smell?

Polyester.

3. The manufacture of which artificial fibre contributes to deforestation?

The manufacture of Rayon which is obtained from wood pulp contributes to deforestation.

4. Why is polyester not suitable for summer wear?

Polyester absorbs very little water hence, it does not absorb sweat, so it becomes unsuited for summer.

5. Plastics are poor conductors of heat and electricity. Explain by giving examples.

Plastics are poor conductors of heat and electricity. So, the handles of cooking utensils (like frying pans and pressure cookers) are made up of plastics so that we can hold the hot utensil safely without getting our hands burnt.

Even electrical wires have plastic covering and also handles of screw drivers, so as to protect us from electric current passing through them.

6. "Avoid plastics as far as possible". Comment on this advice.

Plastics are non-biodegradable materials. So, use of plastic is harmful for our environment. Plastics cannot be completely disposed of. Thus, plastics should be avoided as far as possible.

II. High Order Thinking Skills (HOTS) Questions

1. What nature of plastics is used for making them as good storage containers of chemicals?

Plastics are non-reactive. They are used to store chemicals because they do not react with them.

2. What type of clothes should we buy for summer; cotton or clothes made from synthetic materials? Give reason for your answer.

Cotton clothes are more comfortable during summer, because they have large pores which allow the sweat of body to come out through them, evaporate and this make us feel cool.

I. Value Based Questions.

1. Human actions are leading to environment problems. But, we need not feel powerless or helpless as there are many things we can do to make a difference. Keeping in view the above statement, answer the following questions :

(a) What are the 4-R's by which we can make a difference in our environment?

(b) How can you contribute at your own level to save the environment?

(a) As a responsible citizen we must remember the 4-R principle. Reduce, Reuse, Recycle and Recover. Development of these habits is environment friendly. Reduce the use of plastic as it is a non-biodegradable substance. Reuse such plastic which get deformed easily on heating and can be reshaped in any form. Recycling also reduces the cost of articles and saves resources.

(b) I can contribute at my own level to save the environment as follows :

- I will not throw plastic bags in the water bodies or on the road.

- I will take a cotton bag or a jute bag while going for shopping.
- I will try to minimize the use of plastic materials e.g., use a steel lunch box instead of a plastic one.

2. Shruti's mother went to the market to buy new lunch box for Shruti. She saw different lunch boxes made up of plastics as well as steel. Plastic lunch boxes of different colours were very attractive but the steel lunch box was very simple. Shruti's mother told her to select a lunch box for her. She selected a lunch box made of steel instead of plastic one. Her mother purchased the steel lunch box for her.

Read the passage and answer the following questions :

(i) Why does Shruti prefer steel lunch box instead of plastic one?

(ii) Are plastic materials environment friendly? Explain.

(iii) What values are shown by Shruti?

(i) Shruti was aware that plastic is a non biodegradable material. Disposal of plastic is a major problem. It is not easily decomposed by natural process. So, to avoid the use of plastic she prefers to take steel lunch box.

(ii) No, plastic materials are not environment friendly since, they take several years to decompose and cause environmental pollution. Besides, in the burning process it releases lots of poisonous fumes (gases) into the atmosphere causing air pollution.

(iii) Shruti is very aware, sensible and intelligent girl.

Skill Based Questions

1. Observe the following figure and answer the following questions.

(a) Identify the articles used by the persons in the figure.

(b) Name the substance used in making these articles.

(c) Why does this substance is used in making these articles?

(a) The articles are parachute and roes for rock climbing.

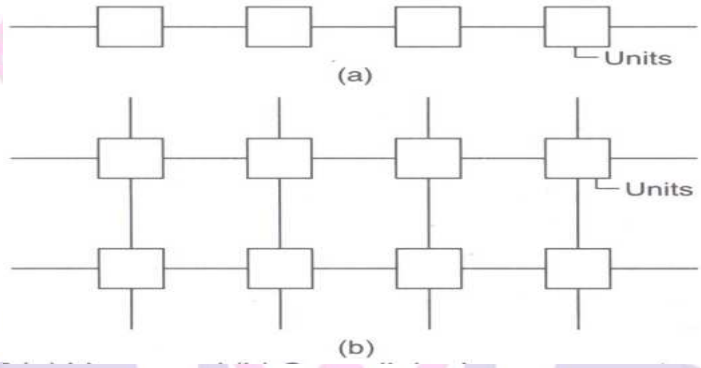
(b) The substance used in making these articles is nylon.

(c) Nylon is actually stronger than steel, so it is used for making these articles.

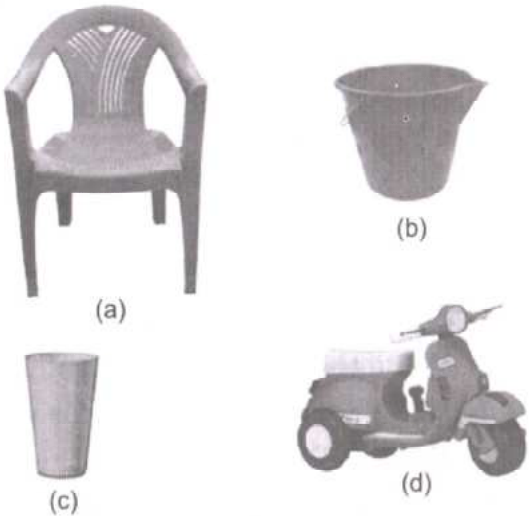
2. Draw a diagram to show the ;

(a) Linear arrangement of units in plastic.

(b) Cross-linked arrangement of units in plastic.



3. Observe the following articles and name the substance used in making these articles.



The articles are as follows;

a. Chair

b. Bucket

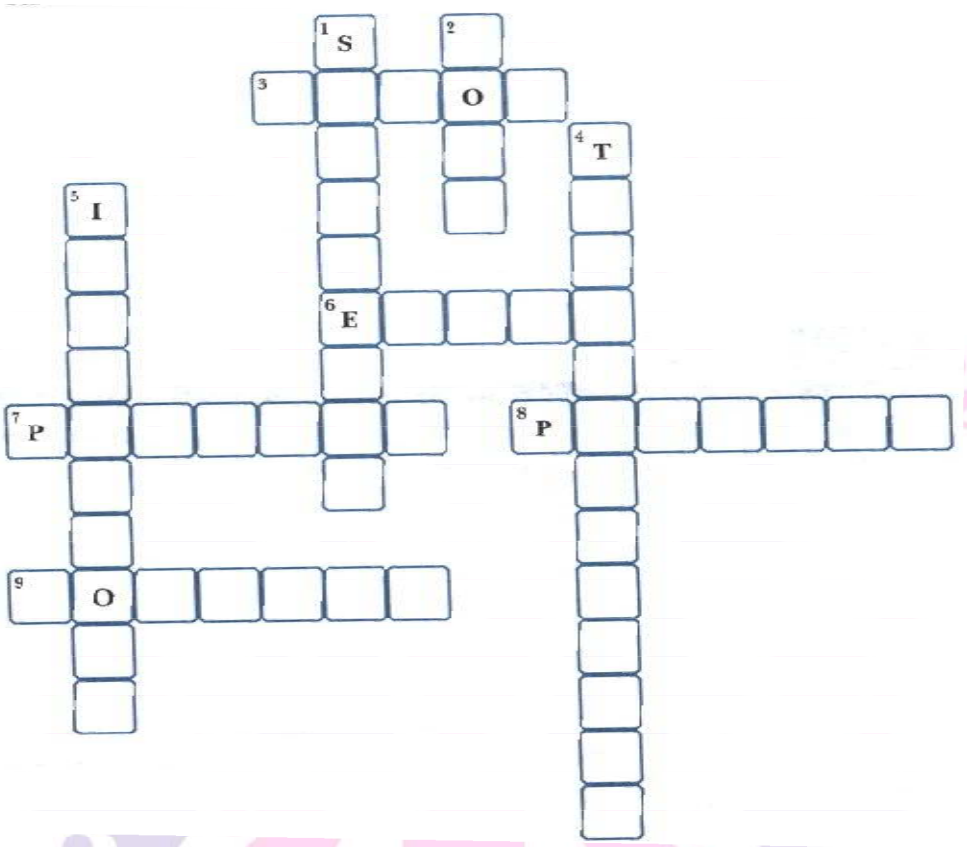
c. Glass

d Toy Scooter

These articles are made up of a polymer called plastic.

I. Cross word Puzzle

Fill in the crossword ladder with the help of the hints provided.



Across

3. First fully man-made fibre
6. Compound used to form polyester
7. A synthetic material which is non-reactive
8. Monomers combine to form this substance
9. Small units of synthetic fibres

Down

1. Not natural
2. When burnt, smells like burning hair
4. Plastic which softens on heating
5. Do not conduct heat or electricity

Across	Down
3. Nylon	1. Synthetic
6. Ester	2. Wool
7. Plastic	4. Thermoplastic
8. Polymer	5. Insulator
9. Monomer	