CHAPTER: SYNTHETIC FIBRES AND PLASTICS

Grade: **8**
Board: **CBSE**
Book: **NCERT**

1.

CHAPTER SUMMARY AND PLACEMENT

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>

1. In the previous classes, students have learnt about natural fibres and how are they obtained.
2. This chapter introduces the students about man-made fibres called synthetic fibres, their types, characteristics. This chapter further explains about plastic.
3. Since the chapter is focussed on various synthetic fibres used in our daily life, the articles made out of synthetic fibres have been used as resources in the teaching plan.

2.

LEARNING OUTCOMES

<On completion of the chapter, students will be able to:>

1. Understand synthetic fibres.
2. Identify and differentiate Rayon and Nylon?
3. Understand about Polyester and Acrylic.
4. List down characteristics of Synthetic Fibres.
5. Explain about Plastics, their types and characteristics.
6. Describe the effect of plastics on environment.

3. KEYWORDS

Definitions of some terms used in the chapter:

Synthetic Fibres: These are man-made fibres.

Polymer: Many repeating units (monomers) combine to form a polymer.

Thermoplastics: These plastics which get deformed easily on heating and can be bent easily.

Thermosetting plastics: These plastics when moulded once cannot be softened by heating.

Biodegradable: A material which gets decomposed through natural processes such as by action of bacteria.

Non-biodegradable: A material which is not easily decomposed by natural processes.

3. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently

Subtopic and Learning Objective #1

What are Synthetic Fibres, Types of Synthetic Fibres
Understand synthetic fibres.
Identify and differentiate Rayon and Nylon?

Teacher Activity

Make students recall that cotton and wool are natural fibres which they have studied in previous classes.

1. Show them socks, curtains, and toothbrush and tell them that these are made up of man-made fibres. Introduce synthetic fibres (made from petrochemicals - materials made from petroleum origin) to them.
2. Perform Activity 1 to introduce them about polymer and that synthetic fibres are made up of many small units.
3. Show some synthetic bed sheets (rayon mixed with cotton) or curtains (rayon mixed with wool) to the students and introduce Rayon fabric to them.
4. Conclude Activity 1 by discussing about rayon (prepared by chemical treatment of wood pulp, artificial silk, can be woven like silk-fibres.)
5. Show socks, ropes for rock climbing, toothbrush, car seat belts, parachutes (you can also show images from Resource 1) and discuss about another synthetic fibre - Nylon (prepared from coal, water and air, strong, elastic and light).

Check for understanding:

a. Give two point of differences between rayon and nylon.
b. Which is the strongest fibre between the two?
   Nylon, Rayon

Resources Suggested

Blackboard, chalk, Resource 1, Socks, Rayon bed sheet, rayon carpet, toothbrush, car seat belt

ACTIVITY 1:

Name of the activity – Let's join and create.
Type of activity – Group/Demonstration
Use it for – Synthetic Fibres and Polymer
Materials – Safety pins (around 20-30)
Procedure :

1. Ask students to attach each safety pin to a thread in a way as shown in the diagram.
2. Tell them the way safety pins (which are repeating units) are joined to form a necklace, the synthetic fibres are also made of small repeating units
3. Discuss that manby small units combine to form a large unit called polymer. (In Greek, the word "poly" means many and the word "mer" means part/unit).
4. Recall that they have studied about a natural fibre called cotton, which is also a polymer called cellulose. Its repeating units are glucose.



RESOURCE 1



SOCKS



BRUSH



CURTAINS



Rayon bed sheet



Rayon carpet



Nylon thread to make parachute



Ropes for rock climbing made out of nylon

Subtopic and Learning Objective #2

Types of Synthetic Fibres, Characteristics of Synthetic Fibres
Understand about Polyester and Acrylic.
List down characteristics of Synthetic Fibres.

Teacher Activity

1. Ask students if they have ever observed shirts/dress material which does not get wrinkled easily (remains crisp and easy to wash). Introduce them that such materials are polyester (monomer - ester; esters have fruity smell). Refer Resource 2.
2. Examples of polyester - Terylene, PET (Polyethylene terephthalate - used for making bottles, utensils, films)
3. Also state about mixing of two fabrics - Polycot (Polyester+cotton), Polywool (Polyester+wool)
4. You can show a pure wool and a synthetic wool (acrylic wool) cloth/garment to students and introduce Acrylic fibres to them. Refer Resource 2.
5. Discuss about acrylic fibres. (more durable, cheaper, available in many colours)
6. Perform Activity 2 to understand the characteristics of synthetic fibres

Check for understanding:

a. Which synthetic fibre is used for making bottles, utensils, films?
b. Give two properties of synthetic fibres.

Resources Suggested

Blackboard, chalk, Resource 2.

RESOURCE 2:



Garments made out of Polyester fabrics





Garments made out of Acrylic

ACTIVITY 2:

Name of the activity – Let's compare!!
Type of activity – Group/Demonstration
Use it for – Characteristics of Synthetic Fibres
Materials – Different materials of natural and synthetic fibres (Pure cotton shirt, pure woolen shirt, polyester shirt and acrylic wool sweater)
Procedure :

1. Divide the class into 4 groups (if more then arrange for more fabrics), and distribute one kind of fabric to the representative of each group.
2. Ask them to identify the fabric and do the following activities.
3. Ask them to estimate its cost, tell if it will be durable or not.
4. Ask the representative of each group to wet the cloth by equal amount of water and leave it for drying and calculate the time.
5. Students may take help of the teacher/parents to fill certain observations.
6. Conclude the activity by differentiating between natural and synthetic fibres.

Group	Name of the fabric identified	Cost (Expensive/Cheap) - To be estimated	Time taken to dry	More durable/Less durable	Will they catch fire (taught in previous class, so it can be done by simply recalling)
A					
B					
C					
D					

Subtopic and Learning Objective #3

Plastics, Plastics as Materials of Choice, Plastics and the Environment
Explain about Plastics, their types and characteristics.
Describe the effect of plastics on environment.

Teacher Activity

1. Ask students to write down in their notebooks the material of the following things kept in their houses / kitchen.
   Bottles, Snacks jar, Bread box, Lunch boxes, Chair, Toys, Comb, Mugs, Bucket, Straw
   Students will see that most of their answers will be plastic.
2. Explain the high need of plastic by us. (easy handling, cheaper, strong etc.)
3. Perform Activity 3 to understand the properties of plastics.
4. Discuss about two types of plastics - Thermoplastics (which get deformed easily on heating and can be bent easily. Eg: Polythene and PVC) and Thermosetting (which when moulded once cannot be softened on heating, eg: Bakelite and Melamine).
5. Explain students that apart from being a material of our choice, plastics are a major problem to our environment (Disposal of plastic is a major problem). Refer Resource 3.

6. Introduce terms - Biodegradable (material that gets decomposed by natural processes) and Non-biodegradable (material which is not easily decomposed by natural processes).
7. Mention to students the ways to reduce the use of plastic materials. (5R principle - Reduce, Reuse, Recycle, Recover, Refuse)

Check for understanding:

a. Differentiate between thermosetting and thermoplastics.
b. Why should the use of plastics be curbed?

Resources Suggested

Blackboard, chalk, Resource 3.

RESOURCE 3:

Articles made of plastic





Articles made of plastic

ACTIVITY 3:

Name of the activity – Plastics Our friend!!
Type of activity – Group/Demonstration
Use it for – Properties of Plastics
Materials – Different objects made of plastic and metals..
Procedure :

1. Divide the class into many groups depending on their class size.
2. Ask students to observe a metal container and a plastic container and ask them to fill the observation table as shown below.
3. Conclude that their answers to all these questions would be plastic. Hence list down the properties of plastic and their uses.

Which of the two is:	Metal/Plastic
a. Easy to handle	
b. Does not react with air or water	
c. stronger	
d. durable	
e. Poor conductor of heat and electricity	

4. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Use it like: test after introduction of photosynthesis, homework, class assignment

1. Mention two ways to solve the problem of disposal of plastic garbage.
2. What do you mean by thermosetting plastics. Give two examples.
3. Name a familiar form of polyester. Give its one use.
4. Which synthetic fibre is called artificial silk? Give two articles made out of it.
5. Give two characteristics of synthetic fibres.
6. Give two features of plastic which makes them a favourable choice.

Worksheet 2

Use it like: checking students understanding in class, oral test

Multiple choice questions:

1. Which of the following is biodegradable?

a) Tin
b) Aluminium
c) Paper
d) Plastic

2. State whether the following statement is true or false.
   A plastic vessel is not affected by the heat of the microwave.

a. True
b. False

3. Nylon fibres are used to make:
a. Socks
b. Ropes
c. Curtains
d. All of these

4. Which of the following material does acrylic resemble?
a. Cotton
b. Silk
c. Wool
d. Jute

5. Polythene and PVC are examples of _____.
a. Thermoplastics
b. Thermosetting plastics
c. Rayon fibres
d. Nylon fibres

6. Which of the following are used as raw materials for the preparation of synthetic fibres?
a. Petrochemicals
b. Detergents
c. Acids
d. Bases

7. Rayon is obtained from _____.
a. Wood pulp
b. Polyester
c. Coal and water
d. Both a and c

8. Which of the following man-made fibre is made of coal, water and air?
a. Rayon
b. Nylon
c. Acrylic
d. Polyester

9. Which of the following is NOT a characteristic of synthetic fibre?

a) They are expensive.

b) They quickly dry up.

c) They are durable.

d) They are easy to maintain.

10. Is a nylon thread stronger than a steel wire?

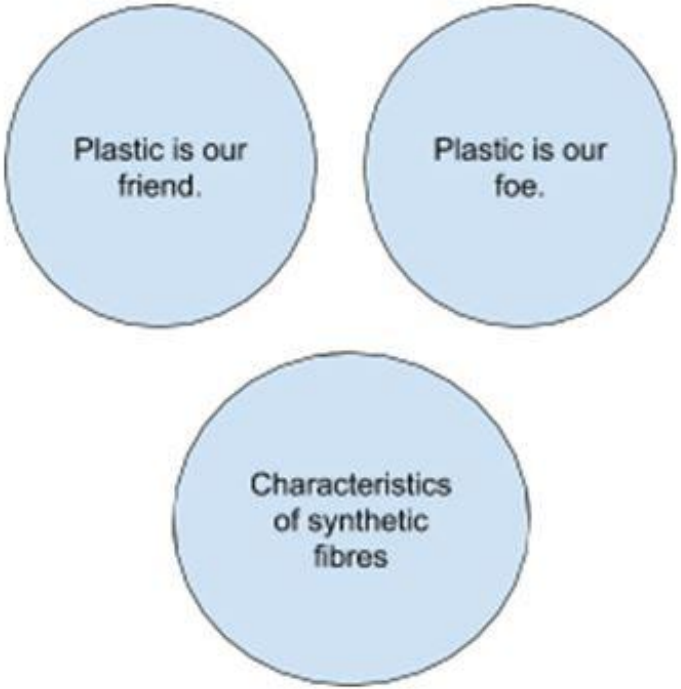
a. Yes

b. No

Worksheet 3

Use it like:

Students need to comment or write down two points for the heading/topic written on each circle.



5. SOLUTIONS

This section gives you sample answers for activities and questions listed above.

Worksheet 1

1. Two ways to solve the problem of disposal of plastic garbage:
   a. We should carry cotton and jute bags in place of plastic bags during shopping.
   b. We should minimise the use of plastic materials (Using a steel lunch box instead of plastic.)
2. Thermosetting plastics are some plastics which when moulded once cannot be softened by heating. Bakelite and Melamine are its examples.
3. PET (polyethylene terephthalate) is a familiar form of polyester. It is used for making bottles, utensils, films, wires etc.
4. Rayon is also called as artificial silk. Bedsheets and carpets are made out rayon.
5. Two characteristics of synthetic fibres are::
   a. They dry up quickly.
   b. They are durable and cheap.
6. Features of plastic which make them a favourable choice are:
   a. Plastic is non-reactive
   b. Plastic is light, strong and durable

Worksheet 2

1. c) - Paper
2. a) - True
3. d) - All of these
4. c) - Wool
5. a) - Thermoplastics
6. a) - Petrochemicals
7. a) - Wood Pulp
8. b) - Nylon
9. a) - They are expensive.
10. a) - Yes

6. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them

1. **Video Links:**

   Show the following videos to the students on computer/ tablet/ screen:

a) Synthetic Fibres
   https://www.youtube.com/watch?v=xmrdtDurPXQ

b) Plastics and Their Uses
   https://www.youtube.com/watch?v=0lX0AKHv0A4

2. **Extension involving more concepts:**
   Ask students to visit any five or ten families of their relatives/neighbourhood. They need to ask their choices of the fabrics they use for various purposes (clothes/curtains/bed sheets etc.) They can also ask the reason of their choices and can list down various uses of these fabrics