6. Substances in Daily Use

Can you recall?

1. Which three objects do you see in the picture?
2. How did you identify them ?
3. What material are they made of ?
4. Can any one of these materials be used to make all the three objects?

6.1 : Different objects

Substances and objects

All substances are made up of very small particles. Objects are made up of substances. Objects have a specific shape, their parts have a specific arrangement, by which we identify them. We use wood, plastic or steel, to make a table, chair or cupboard. These substances have the strength required to make these articles. Also, these substances can be given a desired shape. It means that we consider the properties of substances to use them for making things.

The same substance or material can be used to make many objects. Let us study some such examples.

Cotton – cloth, fibre or thread, sarees, handkerchiefs, quilts, mattresses, pillows, etc.

Iron – construction steel bars, griddles, (*tawa*), parts of automobiles, electric poles, tables, cupboards, etc.

Aluminium – kitchen utensils, electrical cables, etc.

By studying the properties of substances, we can select substances suitable for our purposes. The substances in everyday use are of two main kinds – natural and man-made substances.

Try this.

Make a list of various objects in your house and note down the substances they are made of.

Classify.

Classify the following substances according to their uses.

Substances - sand, soap, wool, window glass, bamboo, cotton, bricks, silk, leafy vegetables, cement, fruits, water, sugar.

Use your brain power!

Make a list of objects, each of which can be made from several substances.

Can you tell?

1. What is the difference between these two groups of natural substances – leather, jute, wool, cotton and water, soil, metals.

Natural substances

Substances available in nature are called **natural substances**. Of these, the substances of the first group are obtained from living things. Substances obtained from living things are called **biotic substances**. Air, soil, water are substances that are not obtained from living things. They are called **abiotic substances**.

2. How are leather and wool different from jute and cotton?

Leather and wool are obtained from animals. They are of **animal origin**, whereas jute and cotton are substances of **plant origin**.

3. Do we find plastic, nylon, brass or cement in nature?

Man-made substances

It is human nature to strive for newer things and to try to make life more comfortable. As a result of his efforts, man not only learnt to use natural substances but also began to process them to make new substances. Several such substances are easier to use and can be made available in plenty at a low cost. Therefore, these substances came to be used on a large scale. There are a great many such man-made substances in use today.

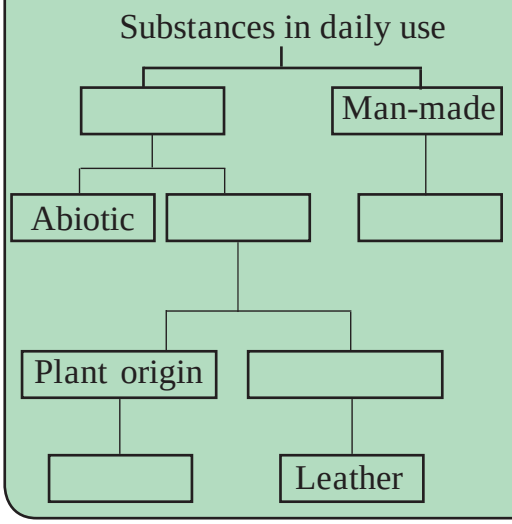
New substances produced by processing naturally available substances are called **man-made substances**.

Earlier *irlis* or capes made of grass or sackcloth were used for protection from rain. Then cloth umbrellas came into use. Nowadays, the raincoat, school bags and the book covers you use can all be made from plastic.

Delicate articles, perishable fruits, etc. require packing. To pack TV sets, refrigerators, etc. big cartons and thermocol are being used. All these are man-made substances. These substances are water proof or water resistant, lightweight and easy to transport. That is why, they are being used increasingly.

Use your brain power!

Complete the table below, showing how substances of daily use are classified.



Classify.

Classify the various substances available in the house as natural and man-made substances.

Examples of man-made substances

Area of use	Natural substances	Man-made substances
Construction	Bamboo, stone, soil, wood, coconut fronds, lime	Brick, cement concrete, galvanized sheets, clay tiles, plastic/ asbestos sheets
Writing material	Tree bark, leaves, *bhurjpatre*, pens made from reeds, *dhulpatya*, stone slates, stone walls in caves, soil and colours made from plants	Pens, pencils made from plastic and metal, paper, notebook, etc.
Threads / Fibre / Yarn	Cotton, silk, wool	Nylon, rayon

Glass can be made from sand and calcium carbonate. However, sand and calcium carbonate cannot be obtained again from glass.

You must have observed green chillies or tomatoes turning red after some time. Have you ever seen or heard of red tomatoes becoming green again?

While making man-made substances, the properties of the constituents undergo a change. This change occurs due to certain chemical reactions. These changes in the properties are permanent, that is, the original constituent substances cannot be obtained again from the new substances. Such changes are called **irreversible changes**.

Production of substances

Rubber

Rubber is of two types, natural and artificial.

Natural rubber is obtained from the gum or sap of trees. This sap is called 'latex'. Rubber has a peculiar odour and it is white in colour.

Vulcanization of rubber

In this process, rubber is heated with sulphur for three to four hours. To give hardness to the rubber, sulphur is mixed in it. The proportion of sulphur in the mixture is determined by the purpose for which the rubber will be used.

Erasers, rubber balls, rubber toys all have varying proportions of sulphur in them. In rubber bands, the proportion of sulphur is very small.

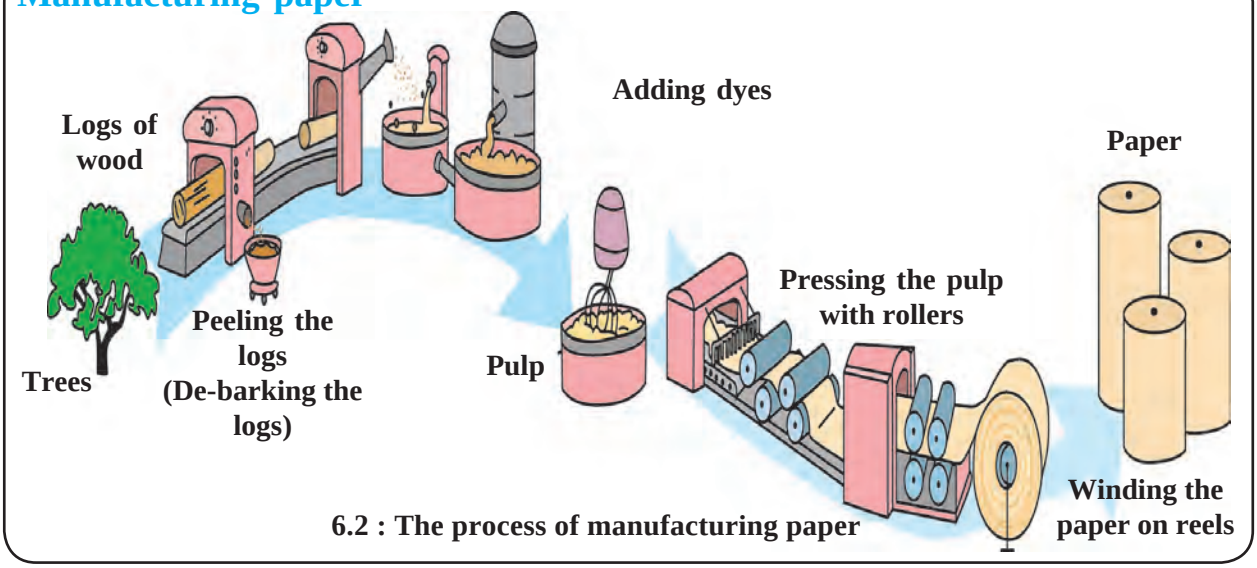
In the past...

Charles Goodyear spilled a mixture of rubber and sulphur on a burning stove. After the stove was extinguished, he noticed that the rubber had become harder and less elastic. He repeated this experiment in a systematic way and invented the process of 'vulcanization'. Hard and tough tyres of rubber made thenceforth brought about a revolutionary change in transportation.

Do you know?

Rubber is a natural substance obtained by collecting the latex of a certain tree. Rubber trees are found in abundance in Brazil. Later, these trees were planted in other countries too. The botanical name of this tree is '*Hevea brasiliensis*'. In India, the maximum production of rubber is in Kerala.

Manufacturing paper



6.2 : The process of manufacturing paper

Paper

Paper is the substance or material formed due to the intertwining of the cellulose fibres in grass, wood, rags or waste paper. Thus, paper is a kind of network of cellulose fibres.

How is paper made?

Coniferous trees like pine are used to make paper. The bark of the logs of these trees is first removed and the wood is broken into small pieces. The mixture of these pieces and some chemicals is kept soaking for a long time. It helps to form pulp. When the chemical process is completed, the fibrous substances from wood pulp are separated, and some dyes are added. The pulp is then passed through rollers, dried to form paper and finally wound on reels.

Paper and wood are closely related. To save trees, it is necessary to use paper sparingly.

Do you know?

In India, the first factory to manufacture newsprint (paper to be used for newspapers) was established at Nepanagar in Madhya Pradesh in 1955. Paper is also manufactured at Songardh in Gujarat. In Maharashtra, there is a paper factory at Ballarpur near Chandrapur.

Synthetic fibres or threads

Can you tell?

1. From which substances in nature can we get threads or fibre?
2. What are clothes made from?

From the time it was first thought that artificial yarn could be produced to meet the clothing needs of an increasing population, much research and progress has taken place in this field. Innumerable kinds of synthetic or artificial threads are now available. Nylon, dacron, terylene, terene, polyester, rayon are the names of various synthetic threads.

Always remember...

1. Do not tear up blank pages of a notebook. Do not throw away old notebooks with blank pages.
2. The blank sides of advertising pamphlets, inner side of postal envelopes, the blank sides of of calendars pages and other such writable surfaces can be used to make notes, lists, to cover books, etc. Do not throw away or burn up such paper until it has been fully utilized like this.
3. Whenever possible, try to use a pencil and slate.
4. Cooperate with people who collect paper from garbage or buy scrap paper. These people help in the proper recycling of resources.

Find out.

1. Where was the process of making paper invented?
2. What kind of paper is used for our textbooks. What size is it?
3. How is paper for currency notes manufactured?

Do you know?

Silk is a natural thread or fibre obtained from the cocoons of silk worms. From one cocoon, 500 metres to 1300 metres of thread can be obtained. It is said that silk was first produced on a large scale in China.

6.3 : Artificial threads

Almost all the articles made from natural fibres in the olden days can now be made from synthetic threads.

Nylon, rayon, terylene, acrylic are all synthetic threads and many articles in our daily use are made from them.

Nylon

These threads were invented at the same time in New York and London. Therefore the initials NY of New York and LON from London were combined to name them NYLON. Nylon threads have a shine and are strong, transparent and water resistant. They are used to manufacture clothes, fishing nets, ropes, etc.

Rayon

Cotton and wood pulp is dissolved in a chemical called sodium hydroxide to make a solution. Threads are obtained from this solution with the help of machines. As these threads have shine and strength, they are said to be 'synthetic silk'. They appeared to be shining bright like the sun's rays. Hence they were named 'Rayon'.

Dacron, Terylene, Terene

Various hydrocarbons obtained from mineral oils are used to make polymer chains. A solution of such a polymer is pressed through a strainer with fine holes. The fibres formed after cooling, are long and unbroken threads. These threads are twisted to obtain yarn.

Different types of chemicals are used to make threads of various properties. These different threads have been named variously as dacron, terylene, terene, etc.

New words

1. **Hydrocarbons :** Substances obtained from mineral oil.
2. **Polymer chains :** Long continuous chains formed by small, interlinked chemical units.

6.4 : Uses of artificial threads

Advantages and Shortcomings of Synthetic Fibre

Advantages

1. These fibres can be manufactured on a mass scale.
2. They cost less.
3. They are strong and durable.
4. They can be used for a long time.
5. They are water repellant, hence, do not rot or get wet. They dry easily.
6. They are lightweight and comfortable to wear.
7. As they have a shine, they enhance the appearance of the wearer.
8. Clothes made from these threads are wrinkle-free and scratch-free.

Shortcomings

1. They are water repellant. Hence, do not absorb sweat from the skin.
2. Continuous use of clothes made from these threads keep the skin moist, which may cause skin diseases.
3. Synthetic clothes are uncomfortable to wear especially in summer.
4. Synthetic fabric catches fire easily.
5. If they catch fire, the cloth sticks to the skin and causes serious injuries.
6. These fibres are not decomposed by micro-organisms.

Always remember...

- Save trees to save nature; save paper to save trees. Use paper properly and economically. Make full use of it and recycle the used paper.
- Although there are some disadvantages in using synthetic fibres, they can be useful if they are used in the proper way. They reduce the load on the use of natural resources.

What we have learnt–

- We use two types of materials – natural and man-made. Natural materials may be biotic or abiotic. Biotic materials are either of plant origin or animal origin.
- Rubber, paper and synthetic fibres are important man-made materials in our daily use.
- Man-made materials are obtained by using certain processes.

Science watch ...

While studying science, we do verify whatever we learn, but what about others? It is necessary to explain to everybody that there is science behind every phenomenon. Let us explain to them what we have learnt and let us act on the basis of our knowledge.

Exercise

1. Fill in the blanks using proper words.

(a) Rubber made by vulcanization is a …… material.

(b) Man-made materials are made by ……. natural materials.

(c) …..... thread was developed simultaneously in New York and London.

(d) Rayon is also known as ……

2. Answer the following questions.

(a) Why did the need for man-made materials arise?

(b) Which are the natural materials obtained from plants and animals?

(c) What is vulcanization?

(d) Which natural materials are used to obtain fibres?

3. What are we used for?

(a) Soil

(b) Wood

(c) Nylon

(d) Paper

(e) Rubber

4. How is paper manufactured? Write in your own words.

5. Give scientific reasons.

(a) We must use cotton clothes in summer.

(b) We must observe economy in the use of materials.

(c) Saving paper is the need of the hour.

(d) Man-made materials have more demand.

(e) Humus is a natural material.

6. Find out.

(1) How is lac obtained from nature?

(2) How are pearls obtained?

Activity

- Visit a rubber, paper or textile industry in your area and collect information about it.
- Collect various samples of paper and note their uses.
- Use blank pages from old note-books and make a new one.