St. Andrews Scots Sr. Sec. School

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Class: VI

L-4: Sorting Materials Into Groups

Topic: Notes

OBJECT

Object is a thing that is made up of one or more material.

Example : pencil, chair, pen, book, food item, etc

MATERIAL

Material is what object is made up of.

Example : pencil is made up of wood , metal , graphite , etc.

OBJECT AROUND US IS MADE UP OF VARIETY OF MATERIALS

Sr.No	Object	Material the are made up of	
1	Chair	Wood, plastic, iron	
2	Toys	Wood, plastic, Paper	
3	Shoes	Leather	
4	Clothes	Cotton, silk, polyester , nylon	
5	Tumbler	Plastic, glass	
6	Utensils	Plastic, iron , aluminium , steel	
7	Pen	Plastic, metal, wood.	

CLASSIFICATION OF MATERIALS

The process of arranging the objects on the basis of certain similarities is called **Sorting** or **Classification**.



Our surrounding is divided into two types i.e. Living things and Non-living things. Living things are further subdivided into Plants and Animals. Similarly Non-living things are classified on the basis of their use, source and material of which they are made of. On the basis of their source, the things are categorised as natural or human-made.

CLASSIFICATION OF MATERIALS ON THE BASIS OF COMMON PROPERTIES

Different materials have different properties or characteristics. Therefore, they can be classified on the basis of their properties. Their are two properties which are common in all materials i.e. **Mass** and **Volume.**

Mass is the amount of substance that something contains. The mass of an object is measured in kilograms(Kg).

Volume is the amount of space occupied by a material. The volume is measured in litres(l) or millilitres(ml).

MATTER

Everything in this universe is made up of **Matter**. **Matter** is defined as any substance that has mass, occupies volume and may be perceived by the senses.

Exception: Phenomena like heat, electricity, light, sound, magnetism, vacuum, shadow are not matter because they have no mass and does not takes up space.

Matter is made of very small independent particles called <u>molecules</u>. The particles of the matter are very small.

STATES OF MATTER

Matter exists in three states – Solid, Liquid and Gas.



CHARACTERISTICS OF PARTICLES OF MATTER

Molecules of any kind of matter attract each other. <u>The force of attraction between the</u> <u>molecules is called</u> **intermolecular force**.

The intermolecular force between molecules depends on the space between them. This space between the molecules is called intermolecular space. The greater the space between molecules, the lesser the force of attraction. The intermolecular force is high when the space between the molecules is less.

The molecules in a **solid** are very closely arranged, resulting in very small intermolecular spaces in solids. The intermolecular force of attraction in solids is very strong because of the small intermolecular spaces. This is also the reason why solids cannot be compressed. The molecules in a solid cannot interchange their positions, and hence, solids have a definite shape and definite volume.



PACKING OF MOLECULES IN THE THREE STATES OF MATTER

In contrast to solids, the molecular arrangement in **liquids** is not fixed .The comparatively larger intermolecular spaces between the molecules result in weak intermolecular forces of attraction. The molecules in a liquid can interchange their positions because of the flexible arrangement and weak intermolecular force. This is why liquids flow and do not have any definite shape. Instead, they take the shape of the container. Though the intermolecular force between molecules in a liquid is less as compared to solids, the molecules cannot move far apart. Hence, liquids have a definite volume, though they do not have a definite shape.

The molecules in a **gas** are very far apart from each other. Therefore, the intermolecular space in gases is very large and the intermolecular force is negligible. Gases do not have any definite shape or definite volume because of the loose molecular arrangement. They can fill the entire space available to them.

Unlike solids and liquids, gases are easily compressible. This is because when force is applied to gases, the large intermolecular spaces decrease, thereby decreasing the volume.

Properties	Solids	Liquids	Gases
Distance between particles	very close	less close	far
Molecular arrangement	regular	irregular	irregular
Shape	well defined	shape of the container	no shape at all
Volume	fixed	Fixed	not fixed
Speed of movement	the slowest	Faster	the fastest
Forces of attraction	the strongest	weaker	the weakest

PROPERTIES OF MATTER

The properties on the basis of which we can distinguish materials are appearance, texture, lustre, hardness, solubility, transparency, density, thermal conduction, diffusion, electrical property and magnetic property. We will study these properties one by one.

1. Appearance

The various parameters governing the appearance of materials are colour, texture, roughness, shape, size, etc. For example – Wood is different from iron and plastic.

2. Texture

Some materials feel **smooth** when touched. For example - mirror and things made of metals; whereas, some other materials feel **rough** when touched. For example - a piece of stone.



ROUGH

SMOOTH

3. Lustre

Materials that shine are called **lustrous** material. For example – Gold, Silver, Copper, etc.



Materials which do not shine are called **non-lustrous** material. For example – Wood, Plastic, etc.



WOOD AND PLASTIC (NON-LUSTROUS)

4. Hardness

The property of material to withstand stress without breaking is termed as toughness.



Materials that can be compressed or deformed easily are referred to as soft substances.

Materials that are difficult to bend or compress and are termed as hard substances.

5. Solubility

Soluble substances: Substances that get dissolved in water are called soluble substances.

Insoluble substances: Substances which do not dissolve in water are called insoluble substances.

Miscible: Those liquids which mix well with water are said to be miscible.

Immiscible: Substances which do not mix well with water are called immiscible.

Solubility of gases: Solubility of gases in water is very less.

Oxygen gas which is dissolved in water, is very important for the survival of aquatic plants and animals.



6. Transparency

- **Opaque:** Materials through which we are not able to see are called opaque. For example-wood, iron, gold.
- **Translucent:** Materials through which things are only partially visible are called translucent. For example - butter paper, old glass door.
- **Transparent:** Materials through which things can be seen are called transparent. For example glass, water, air, test tube.



7. Density

Materials differ from each other on the basis of their mass and volume. The mass per unit volume of a substance is called its **density**.

It is because of density that some materials **float** in water while others **sink**.

<u>The materials which are less denser than water, they float on water</u>. For example - Plastic bottles, Balloon, etc.

<u>The materials with a greater density than water, sink in water</u>. For example – Sand, Stone, etc.



8. Thermal Conduction

The substances which allow heat to pass through them are called **good conductors of heat**. For example – Metals like iron, etc are good conductors of heat.

The substances which do not allow heat to pass through them are called **bad conductors of heat**. For example - Wood, Plastic are bad conductors of heat.

9. Diffusion

The process of gases and liquids spreading into surrounding substance is known as **diffusion**. For example - You can smell perfume because it diffuses into the air and makes its way into your nose.

10. Electrical Property

Materials which conduct electricity are called conductors.

For example – Metals are good conductors of electricity like Copper, Iron and Silver. We get electricity in our homes through cables and wires. An electric cable consists of a number of metal wires with or without a plastic covering. The metal wires conduct or transmit electricity whereas the plastic covering do not.



CONDUCTING WIRE AND INSULATING PLASTIC

11. Magnetic Property

Materials that are attracted to a magnet are called magnetic materials. This property is called magnetism. Objects made of iron are attracted to a magnet. In addition to iron, nickel and cobalt are also attracted to a magnet.