

Sorting Materials into Groups

Objects Around Us

There is a vast variety of objects that exists around us besides so much variety in our food and clothes. We see around us, a chair, a cycle, cooking utensils, books, clothes, toys, water, stones and many other objects. All these objects have different shapes, colours and uses.

Grouping Things

There are so many ways to group objects. If we look around and identify objects that are round in shape our list may include a rubber ball, football and objects that are nearly round like oranges and apples. Suppose we were looking for objects that are edible. Our list may include dal, chapatti, fish and rice. We can also make a group of objects that are made of plastics ex: Buckets, lunch boxes, toys, pipes and many other objects. In the above examples we've grouped objects on the basis of their shape and materials they are made from.



Objects Around Us

Visit a grocer's shop. *How has he arranged the things there?* We will find that eatables are kept separated from soaps and mosquito repellents. All types of biscuits, are kept at one corner of his shop while cereals and pulses are kept at different place. The grocer has grouped the things according to his convenience. ***So why do we need to group materials? The grouping helps to locate things. The grouping reduces the chances of mixing the things. In our daily life we all group things for our convenience. At homes we usually store things in such a manner that similar objects are placed together. Groupings are done according to some similarities, need and convenience.***

Classification:

The systematic arrangement of things on the basis of certain similarities or dissimilarities is called **sorting or classification**. In a particular group of things if you know about one thing it helps to know about other things. example if we have ten identical notebooks they form only one group. They cannot be classified. If out of these ten notebooks we have two notebooks each for Hindi, English, Mathematics, Social Science and Science, we can classify them on the basis of subjects.

Sorting of ten Notebooks according to the subject.

Subject	Hindi	English	Mathematcs	Social Sci	Science
No. of Notebooks	Two	Two	Two	Two	Two

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Sorting of Materials into Groups:

If we try to focus on each object we will see that all objects around us are made up of one or more materials. These materials may be glass, metal, plastics, wood, cotton, paper, mud or soil. For example: A book is made by using paper, printing ink, stitching thread and glue. These are called materials. Different things may be made of same or different materials, for ex: A knife may be made from steel and wood. A measuring scale may be made of plastic, wood or steel. A material can be used to make different kinds of things and objects.

Same material and the objects made from them.

S.No.	Materials	Objects
1	Glass	Tumbler, Spectacles, Window pane, Mirror
2	Wood	Table, Chair, Furniture, Bed
3	Plastic	Bucket, Lunchbox, Toys, Mug
4	Paper	Books, Newspapers, Calanders, Notebooks

Same objects made from different materials

S.No	Object	Material used
1	Tumbler	Stainless steel, Glass, Plastic, wood
2	Pen	Plastic, Metal
3	Plate	Steel, Glass, Plastic

We have to choose a material to make an object depending on its properties and the purpose for which the object is to be used.

Properties of Materials

Some important properties of materials are:

- **Appearance**
- **Hardness**
- **Soluble or insoluble**
- **Floatation**
- **Transparency**

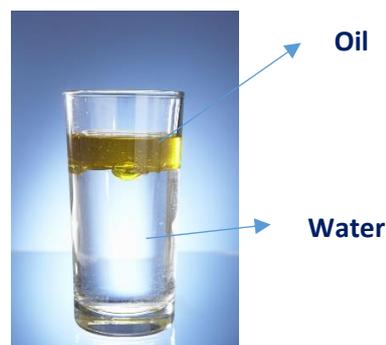
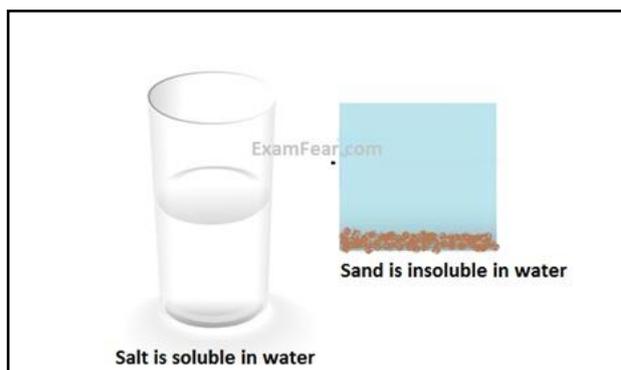
Appearance: Materials can be differentiated from each other on the basis of their looks. Wood looks different from iron. Iron appears different from copper or aluminium. Some materials are shiny while others are not. The shine present in a material is known as lustre. Materials that have lustre are usually metals for example iron, copper, gold, silver, aluminium. *Gold* and *Silver* are highly lustrous metals that is why they are used for making ornaments. Wood and Graphite do not appear shiny and are generally known as non lustrous.

Some metals often lose their shine and appear dull because of action of air and moisture on them.

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Hardness: Materials can also be classified on the basis of hardness. Those materials which cannot be easily compressed, cut, moulded or scratched are called hard materials for example stone, brick, diamond, steel iron etc. Those materials that can be easily compressed, cut, moulded or scratched are called soft materials for example cotton, crayon, sponge, paneer etc

Soluble and Insoluble: Materials can be grouped on the basis of their solubility. Substances which dissolve in water are called Soluble substances. *For example:* Salt, sugar, alum etc. Substances which do not dissolve in water are called insoluble. *For example* Chalk powder, Sawdust and sand do not dissolve in water even on stirring , settle down at the bottom.



Immiscible Liquids

Some liquids such as honey, milk, vinegar completely mix with water they are called miscible liquids. However liquids such as mustard oil, coconut oil and kerosene do not mix with water. They form separate layers.

Some gases are also soluble in water while others are not. Oxygen gas dissolved in water is very important for the survival of plants and animals that live in water.

Flotation: Some objects sink in water where as other objects float in water.

Activity; Take a bucket half filled with water. One by one, drop a feather, an iron key, a steel spoon, a wooden block and a straw into water.

Observation: We see that a feather, a piece of wooden block, straw will float in water while a steel spoon, iron key sinks in water.

So what decides whether an object will float or sink in water? The main reason for this is density which is mass per unit volume. A substance with a density lower than that of water floats on it, whereas the substance with a density higher than water sinks to the bottom. A coin sinks, while a piece of wood of the same shape and size floats in water because coin has higher density than wood.

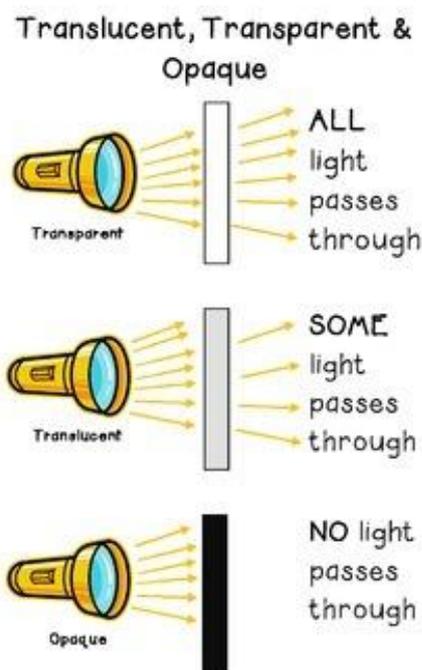
Some liquids which do not mix with water floats on the surface of water. *For example:* oil in water, oil forms the top layer.

Materials can be classified on the basis of their density with respect to water i.e. whether they float or sink in water.



Transparency: Materials can be grouped as transparent, opaque and translucent on the basis of transparency.

- **Transparent:** Materials that allow light to pass through them completely are called transparent or those materials through which things can be seen clearly. For example: Glass, water, air, some plastics, etc.
- **Opaque:** The material which does not allow light to pass through it is called opaque. For example: Wood, iron, cardboard, metal containers, etc.
- **Translucent:** The material through which light can pass partially is called translucent. For example: butter paper, frosted glass, thin plastic, etc.



EXERCISES

(I) Long Answer Questions:

- Q1) Why do we need to group materials? Give two Examples.
- Q2) How do we classify objects based on transparency?
- Q3) Why a metal coin sinks while a piece of wood of same shape and size floats in water ?

(II) Short Answer Questions:

- Q1) Name four objects that can be made from plastics?
- Q2) Why is stone labelled as hard material?

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Q3) Name two miscible liquids?

Q4) Name two substances that are soluble in water?

Q5) Name two objects that can be made using more than one material?

(III) True/False:

Q1) Vinegar is miscible with water.

Q2) Stone is a translucent substance.

Q3) Oil and water are miscible liquids.

Q4) Sorting of things is done on the basis of similarities or differences in their properties.

Q5) A piece of wood floats in water.

(III) Match the following:

<i>Column A</i>	<i>Column B</i>
Stone	Translucent
Feather	Soluble in water
Common salt	Opaque
Frosted glass	Floats in water