

## Chapter – 4: Sorting Materials into Groups

- Anything – seen or touched – object
- Object – made of matter – material

### Objects Around Us

- Many things around us
- Humans, animals, birds, insects, plants, trees, tables, chairs, toys, etc
- We can add more objects to this list – everything around us
- Many natural, many man-made – different shapes, sizes, colours – different properties

### Classification of Objects

- Shopping market – all items – arranged in groups – easy to locate
- Soaps in their own shelf – biscuits in their own shelf – other objects in their own shelves
- Sorting of objects into groups – each group has its own properties – **classification**
- Advantages –
  - Easy to locate
  - Know them better – properties of group – applies to all items inside

### Basis of Classification

- Classification depends on – similarities / dissimilarities – living, no-living
- Further depend on – plant, animal – nature of material, use, colour, shape, size, appearance, hardness, texture

### Classification as Living or Non-living

- Living objects – need food, water – dog, rose, algae, hydrilla, grasshopper, cactus, earthworm, tree, fish, hen
- Non-living objects – do need food, water – table, toy, clothes, pencil, knife, shoes, blackboard, wool, feather, nail

### Classification of living objects as plant or animal

- Living objects – further divided into plant and animals
- Plants – make their own food – rose, hydrilla, algae, cactus, tree
- Animals – do not make their own food – dog, grasshopper, earthworm, fish, hen

### Classification of non-living objects

- Classify on the basis of – material, uses, colour, shape, size, appearance, hardness, texture
- Made of wood – table, chair, bed, door
- Made of metal – nail, utensils, magnet, coin
- Made of glass – beaker, test-tube, funnel, mirror
- Made of plastic – toy, ruler, mug, polythene bag

- Round shape – basketball, orange, globe, apple, earthen pitcher (*ghada*)
- Other shape – water, sugar
- Eatables – water, orange, apple, sugar
- Non-eatables – basketball, globe, earthen pitcher

## Materials

- Anything – has mass, occupy space – matter
- Matter – object made of – material
- All objects – made of one or more materials
- Table – made of wood – material
- Nails – made of iron – material
- 2 types –
  - Natural – wood, coal, rocks, minerals, water, etc – available naturally
  - Man-made – iron, stainless steel, cement, glass, etc – made by men
- Daily life – many objects –
  - Same object – made of different materials
    - Chair – wood, metal, plastic, concrete
    - Coins – copper, silver, gold
    - Shoes – leather, rubber, plastic, canvas
  - Different objects – made of same material
    - Wood – table, chair, doors, windows, shelf
    - Iron – nails, buckets, machines, pipes, utensils
    - Paper – books, note-books, newspapers, calendars, envelope
  - Many objects – made of combination of materials
    - Tea – water, tea-leaves, sugar, milk
    - Concrete – cement, gravel, sand, water

## Properties of Materials

- Many objects – made of different materials – different properties
- Choose material – based on properties – suitable for use
- Tumbler (*glass*) – made of glass, plastic, steel – holds water
- Cooking utensils – made of copper, aluminium, stainless steel – good conductors of heat
- Ornaments – made of gold and silver – shiny appearance
- Buildings, bridges – made of steel – hard and strong

## Classification of Materials

### Based on appearance

- Lustre –
  - Shiny appearance
  - Gold, silver, aluminium, iron, metal alloys
  - Some metals – loose shine – due to action of air and moisture
  - Check for lustre – freshly cut surface

- No lustre –
  - Dull appearance – no shine
  - Paper, cardboard, wood, chalk, cotton

**Based on hardness and softness**

- Hard –
  - Cannot be bent, cut, scratched
  - Iron, steel, diamond, wood, stone, brick, glass, bones
  - Press an iron bar – it cannot be compressed – cannot be cut, bent easily
- Soft –
  - Can be bent, cut, scratched easily
  - Sponge, cotton, wool, foam rubber, candle wax, butter, chalk, clay
  - Press a sponge – compresses – can be cut, bent easily

**Based on solubility in water**

- Soluble –
  - Dissolves (disappears) in water
  - Take a test tube – fill it with water – add some sugar – sugar dissolves in water – soluble in water
  - Common salt, washing soda, potassium, permanganate, copper sulphate, alum, milk, lemon juice, glycerine, alcohol
- Insoluble –
  - Does not dissolve in water
  - Take a test tube – fill it with water – add some sand – does not dissolve in water – settles down at the bottom – insoluble in water
  - Chalk powder, saw-dust, Sulphur, glass, plastic, paper, flour, wax, mustard oil, groundnut oil, coconut oil, kerosene, petrol
- Some gases – soluble in water – oxygen, carbon dioxide – fish exchange gases through gills
- Other gases – insoluble in water – nitrogen, methane

**Based on their heaviness with respect to water**

- Heavier than water –
  - They sink
  - Iron nail – place it in beaker filled with water – it sinks – heavier than water
  - Iron, aluminium, copper, silver, gold, stone, glass, chalk
- Lighter than water –
  - They float
  - Take a beaker – fill it with water – place a wood piece in it – it floats – lighter than water
  - Wood, plastic, saw-dust, dry leaves, ice, oils, kerosene, petrol

**Based on their transparency**

- Transparent –
  - We can see through them easily
  - All the light passes through them
  - Glass, air, water, some plastics, groundnut oil, alcohol, etc
- Translucent –
  - We can see through them partially – semi-transparent
  - Some light passes through them

- Butter paper, oiled paper, tissue paper, muddy water, clouds, etc
- Opaque –
  - We cannot see through them at all
  - No light passes through them
  - Cardboard, wood, metal, brick, stone, book, etc