

## Classification of Matter

Since ancient times, people have tried to understand the world around them. Early Indian philosophers believed that all matter, living and nonliving, comprises five basic elements known as the Panchtatva: Air, Water, Earth, Sky, and Fire. Similarly, ancient Greek philosophers developed a comparable classification of matter. Today, scientists classify matter based on its physical properties and chemical nature.

## Physical Nature of Matter

Two views existed about matter: continuous (like a solid block) and particulate (like sand).

**Activity:** Dissolve 2–3 potassium permanganate crystals in 100 mL water.

**Observation:** The colour remains visible even after dilution, showing that each crystal contains millions of particles that disperse further.



## Characteristics of Particles of Matter

- **Particles of matter have space between them.** For example, when you dissolve sugar in water, you can stir in more sugar because the space between the water molecules allows the sugar particles to fit in.
- **Particles of Matter Are Continuously Moving.** For instance, perfume spreads throughout a room as the particles move through the air.
- **Particles of Matter Attract Each Other:** An example is water droplets forming on a cold glass; the water molecules are attracted and stick together to form droplets.

## States Of Matter

Look around and observe that [states of matter](#) exists in three distinct states: solid, liquid, and gas. These states result from variations in the characteristics of the particles of matter.



Property	Solid	Liquid	Gas
Shape and Volume	Fixed shape and volume	No fixed shape but has volume	No definite shape or volume
Energy	Low	Medium	High
Compressibility	Hard to compress	Slightly compressible	Easily compressible
Molecule Arrangement	Tightly packed, regular	Loosely packed, random	Very loosely packed, random
Fluidity	Cannot flow	Flows from high to low	Flows in all directions
Movement	Very little	Moderate	Free, fast, random
Space Between Particles	Very small	More space	Large space
Attraction Between Particles	Strong	Moderate	Weak
Density	High	Medium	Low
Rate of Diffusion	Very slow	Moderate	Fast

## Can Matter Change its State?

Matter can change its physical state by altering temperature, pressure, or both. For example, heating can turn a solid into a liquid (melting) or a liquid into a gas (evaporation), while cooling can reverse these processes. Increasing pressure can also turn gases into liquids or solids.



## Effect of Temperature on Matter

**Melting (Fusion):** As a solid's temperature rises, its particles gain energy, vibrate faster, and eventually break free, turning the solid into a liquid. The temperature remains constant at the melting point as heat is used to overcome particle attraction. This absorbed heat is called **the latent heat of fusion**.

**Boiling (Vaporization):** When heat is added to a liquid, particles move faster until they gain enough energy to become a gas. The temperature at which this occurs is the boiling point. **Latent heat of vaporization** is the energy needed to convert 1 kg of liquid into gas at the boiling point.

### When Temperature Decreases

- **Gases:** Lower temperatures reduce the kinetic energy of gas particles, causing them to condense into a liquid (e.g., clouds forming).
- **Liquids:** Lowering the temperature causes liquids to solidify (e.g., water freezing into ice).

### Special Cases:

- **Sublimation:** A solid changes directly into a gas without becoming a liquid.
- **Deposition:** A gas changes directly into a solid without becoming a liquid.

Thus, temperature changes can shift matter between different states.

## Effect of Change of Pressure

Applying pressure can compress particles of matter, bringing them closer together and changing their state. For example, CO<sub>2</sub> gas can be solidified by increasing pressure and lowering temperature.

**Evaporation** occurs at the surface of a liquid when it turns into vapour at temperatures below its boiling point.

### Factors Affecting Evaporation:

- **Surface Area:** A larger surface area increases evaporation.
- **Temperature:** Higher temperatures speed up evaporation.

- **Humidity:** Lower humidity levels enhance evaporation.
- **Wind Speed:** Increased wind speed accelerates evaporation.

## Evaporation Cause Cooling

As a liquid evaporates, its particles absorb energy from the surroundings to replace the energy lost during evaporation. This absorption of energy from the surrounding environment results in a cooling effect.

## Key Features of CBSE Notes Class 9 Science Chapter 1 Matter in Our Surroundings

- **Complete Chapter Coverage:** Covers all important topics like states of matter, characteristics of particles, diffusion and evaporation.
- **Based on Latest CBSE Syllabus:** Notes are prepared strictly as per the updated [NCERT Solutions](#) and CBSE guidelines.
- **Conceptual Clarity:** Difficult concepts are explained using simple language, everyday examples, and real-life applications to make learning relatable.
- **Diagrams & Illustrations:** Includes well-labeled diagrams and flowcharts to help visualize concepts for better understanding.
- **Quick Revision:** [CBSE Notes](#) are organized in a concise and easy-to-read format, perfect for quick revision before exams.
- **Important Definitions & Formulas Highlighted:** Key terms, definitions, and formulas are clearly marked to support focused learning.