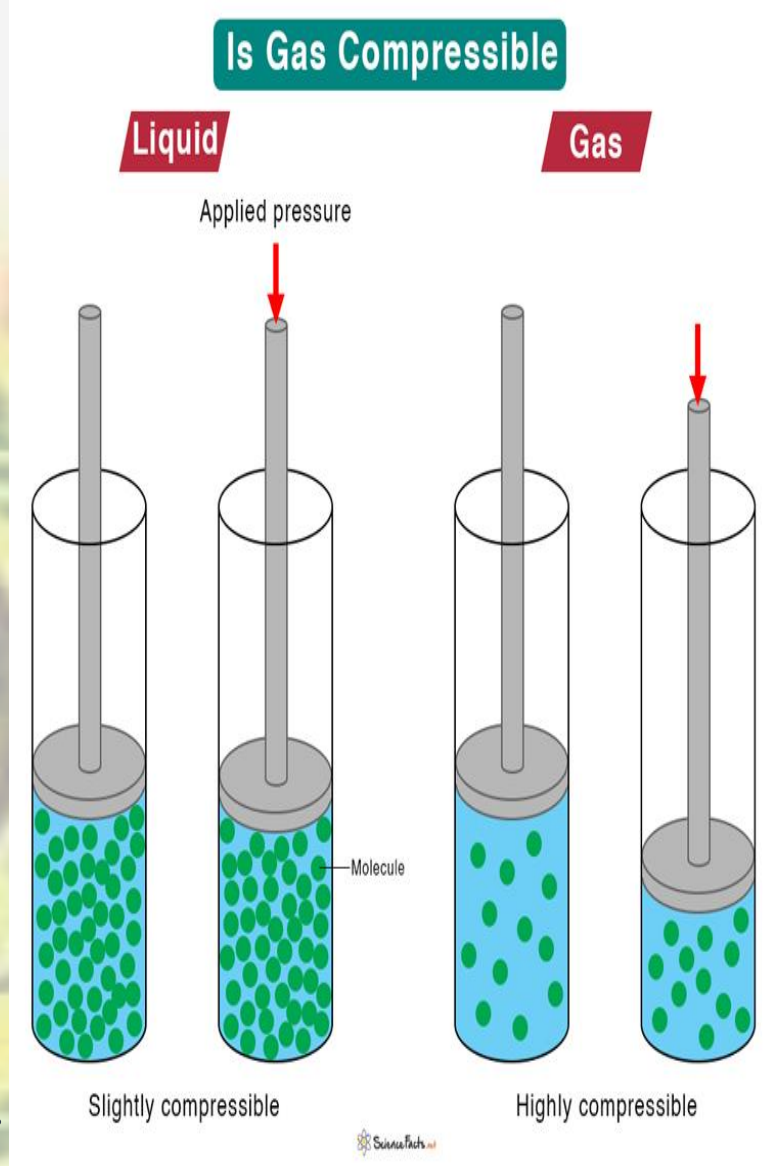
Elements, Compounds, Molecules and Their Behaviour

EFFECT OF CHANGE OF PRESSURE

- **States of Matter Differences:**
  - Attributed to particle spacing.
- **Pressure Effect on Gases:**
  - Applied pressure in a cylinder makes gas particles come closer.
- **Manipulation of States:**
  - Pressure and temperature adjustments can change a substance's state.
- **Liquefaction of Gases:**
  - Increasing pressure and reducing temperature liquefies gases.
- **Solid Carbon Dioxide (Dry Ice):**
  - Stored under high pressure.
  - Directly converts to gas when pressure decreases to 1 atmosphere.
  - Skips the liquid state.
- **State Determinants:**
  - Pressure and temperature jointly determine a substance's state.



Compressibility of Gases

When an airbag triggers due to a sudden stop, a chemical reaction inside the airbag occurs.

One product of the reaction is nitrogen gas, which causes the bag to inflate.

When a person collides with an inflated air bag, the impact forces the molecules of gas in the bag closer together

The compression of the gas absorbs the energy of the impact.

Evaporation

This phenomenon of change of liquid into vapour at any temperature below its boiling point is called evaporation.

FACTORS AFFECTING EVAPORATION

- An increase of surface area: We know that evaporation is a surface phenomenon. If the surface area is increased, the rate of evaporation increases. For example, while putting clothes for drying up we spread them out.
- An increase of temperature: With the increase of temperature, more number of particles get enough kinetic energy to go into the vapour state.
- A decrease in humidity: Humidity is the amount of water vapour present in air. The air around us cannot hold more than a definite amount of water vapour at a given temperature. If the amount of water in air is already high, the rate of evaporation decreases.
- An increase in wind speed: It is a common observation that clothes dry faster on a windy day. With the increase in wind speed, the particles of water vapour move away with the wind, decreasing the amount of water vapour in the surrounding.

HOW DOES EVAPORATION CAUSE COOLING?

In an open vessel, the liquid keeps on evaporating. The particles of liquid absorb energy from the surrounding to regain the energy lost during evaporation. This absorption of energy from the surroundings make the surroundings cold.

Why do we see water droplets on the outer surface of a glass containing ice-cold water?

Let us take some ice-cold water in a tumbler. Soon we will see water droplets on the outer surface of the tumbler. The water vapour present in air, on coming in contact with the cold glass of water, loses energy and gets converted to liquid state, which we see as water droplets.

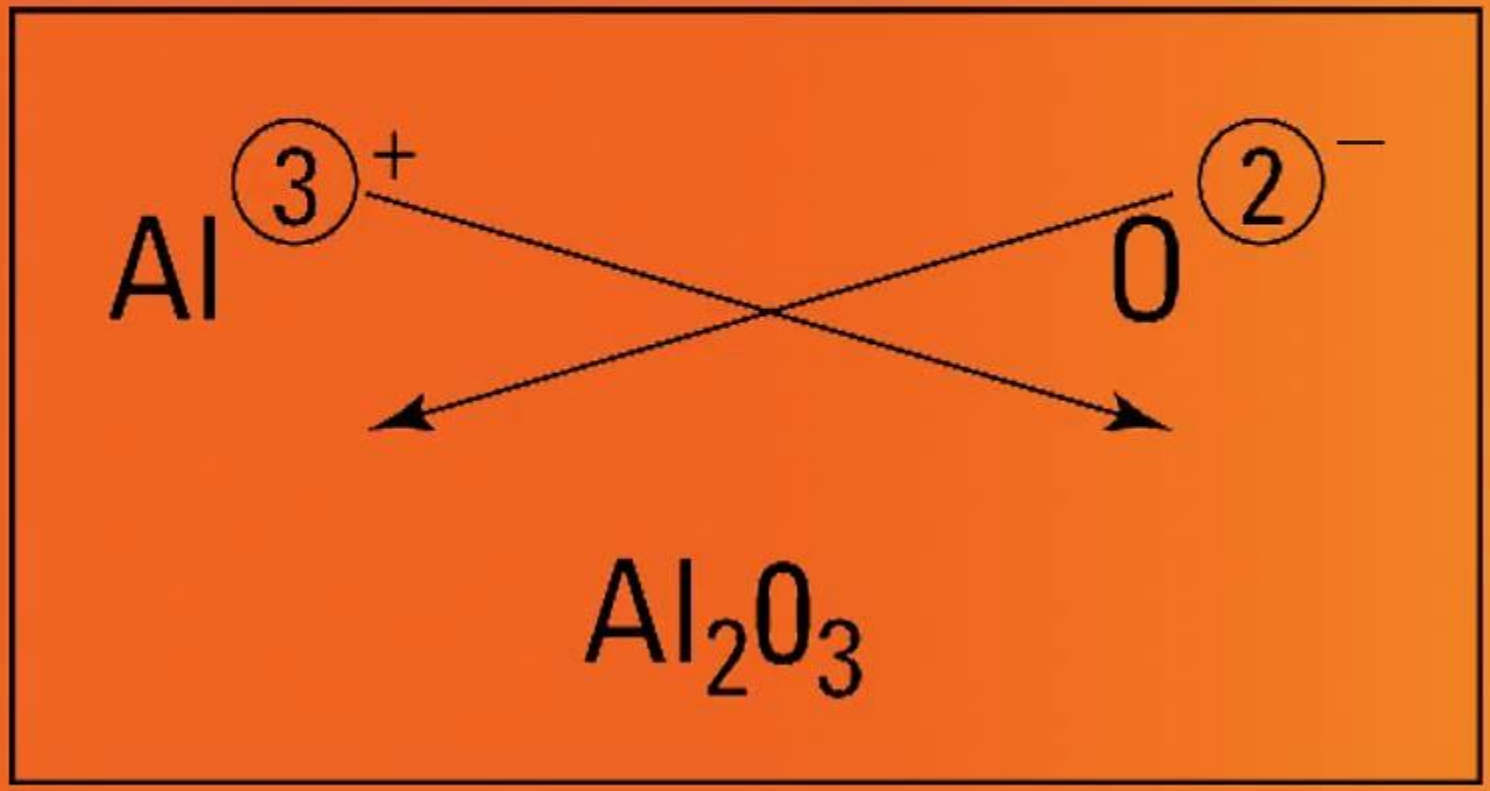
What are the Types of Pure Substances?

On the basis of their chemical composition, substances can be classified either as **elements or compounds.**

Elements can be normally divided into metals, non-metals and metalloids.

COMPOUNDS : A compound is a substance composed of two or more elements, chemically combined with one another in a fixed proportion.

WRITING CHEMICAL FORMULAE OF COMPOUND
CRISS-CROSS METHOD



i) Symbol / Formula Na O

Charge 1 + 2 —

Formula : Na_2O

The formula of sodium oxide is Na_2O.

ii) Symbol / Formula *A*l *C*l

Charge 3 + 1 —

Formula : $AlCl_3$

The formula of aluminium chloride is $AlCl_3$.

iii) Symbol / Formula Na SO_4

Charge 1 + 2 —

Formula : Na_2SO_4

The formula of sodium sulphate is Na_2SO_4.

iv) Symbol / Formula Mg OH

Charge 2 + 1 —

Formula : $Mg(OH)_2$

Write down the chemical formula of following compounds

1. sodium chloride
2. sodium sulphate
3. sodium carbonate
4. magnesium carbonate
5. calcium choride
6. calcium carbonate
7. potassium choride
8. potassium hydroxide
9. lithium hydroxide
10. barium hydroxide
11. aluminium sulphate
12. MAGNESIUM SULPHATE
13. aluminium oxide
14. sodium sulphide
15. silver nitrate