



**A state of matter is one of the distinct forms in which matter can exist.**

**The term *phase* is sometimes used as a synonym for state of matter, but it is possible for a single compound to form different phases that are in the same state of matter. For example, ice is the solid state of water, but there are multiple phases of ice with different crystal structures, which are formed at different pressures and temperatures.**

## **Solid Definition**

In a solid, constituent particles (ions, atoms, or molecules) are closely packed together. The forces between particles are so strong that the particles cannot move freely but can only vibrate. As a result, a solid has a stable, definite shape, and a definite volume. Solids can only change their shape by an outside force, as when broken or cut

- In solids, particles are tightly or closely packed.
- The gaps between the particles are tiny and hence it is tough to compress them.
- Solid has a fixed shape and volume.
- Due to its rigid nature, particles in solid can only vibrate about their mean position and cannot move.
- Force of attraction between particles is adamant.
- The rate of diffusion in solids is very low.
- An example of solids: solid ice, sugar, rock, wood, etc

## **Liquid Definition**

A liquid is a nearly incompressible fluid that conforms to the shape of its container but retains a (nearly) constant volume independent of pressure. The volume is definite if the temperature and pressure are constant. When a solid is heated above its melting point, it becomes liquid, given that the pressure is higher than the triple point of the substance. Intermolecular (or interatomic or interionic) forces are still important, but the molecules have enough energy to move relative to each other and the structure is mobile. This means that the shape of a liquid is not definite but is determined by its container. The volume is usually greater than that of the corresponding solid, the best known exception being water, H<sub>2</sub>O. The highest temperature at which a given liquid can exist is its critical temperature

- In a liquid state of matter, particles are less tightly packed as compared to solids.
- Liquids take the shape of the container in which they are kept.
- Liquids are difficult to compress as particles have less space between them to move.

- Liquids have fixed volume but no fixed shape.
- The rate of diffusion in liquids is higher than that of solids.
- Force of attraction between the particles is weaker than solids.
- Example of a liquid state of matter: water, milk, blood, coffee, etc.

## Gas Definition

In a gas, the molecules have enough **kinetic energy** so that the effect of intermolecular forces is small (or zero for an **ideal gas**), and the typical distance between neighboring molecules is much greater than the molecular size. A gas has no definite shape or volume, but occupies the entire container in which it is confined. A liquid may be converted to a gas by heating at constant pressure to the **boiling point**, or else by reducing the pressure at constant temperature.

- In gases, particles are far apart from each other.
- Force of attraction between the particles is negligible, and they can move freely.
- Gases have neither a fixed volume nor a fixed shape.
- The gaseous state has the highest compressibility as compared to solids and liquids.
- The rate of diffusion is higher than solids and liquids.
- The kinetic energy of particles is higher than in solids and liquids.
- An example of gases: air, **helium**, nitrogen, oxygen, carbon dioxide, etc.

## Plasma

- Plasma is a not so generally seen form of matter. Plasma consists of particles with extremely high kinetic energy. Electricity is used to ionize noble gases and make glowing signs, which is essentially plasma.
- Superheated forms of plasma are what stars are.

A gas is usually converted to a plasma in one of two ways, either from a huge voltage difference between two points, or by exposing it to extremely high temperatures. Heating matter to high temperatures causes electrons to leave the atoms, resulting in the presence of free electrons. This creates a so-called partially ionised plasma. At very high temperatures, such as those present in stars, it is assumed that essentially all electrons are "free", and that a very high-energy plasma is essentially bare nuclei swimming in a sea of electrons. This forms the so-called fully ionised plasma.

The plasma state is often misunderstood, and although not freely existing under normal conditions on Earth, it is quite commonly generated by either **lightning**, **electric sparks**, **fluorescent lights**, **neon lights** or in **plasma televisions**. The **Sun's corona**, some types of **flame**, and stars are all examples of illuminated matter in the plasma state. Plasma is by far the most abundant of the four fundamental states, as 99% of all **ordinary matter** in the universe is plasma, as it composes all **stars**

CHEMISTRY TERM	PHASE CHANGE
Fusion/Melting	Solid to a Liquid
Freezing	Liquid to a Solid
Vaporization/Boiling	Liquid to a Gas
Condensation	Gas to a Liquid
Sublimation	Solid to a Gas
Deposition	Gas to a Solid

Freezing: Change of a substance from liquid phase to solid

Melting: Change from solid phase to liquid

Vaporization: Change from liquid to gaseous form

Condensation: Change from gas to liquid form

Sublimation: Change from solid to a gas without becoming a liquid

Deposition: Change from gas to solid without becoming a liquid

Ionization: Change from a gas phase to plasma (ionized particles)

Recombination: Change from plasma to gas

**Condensation:** Change from gas to liquid form. **Sublimation:** Change from solid to a gas without becoming a liquid. **Deposition:** Change from gas to solid without becoming a liquid. **Ionization:** Change from a gas phase to plasma (ionized particles) **Recombination:** Change from plasma to gas

**What is the difference between chemical and physical forces?**

Physical and chemical processes can be classified by the changes occurring on the molecular level. In general, chemical processes involve changes in chemical bonds, while physical processes involve changes only in intermolecular forces.

**What is?**

**Melting point** is a property of a solid. The melting point is defined as the temperature the solid turns into a liquid. More precisely defined, the melting point is the temperature when the liquid state and the solid state remain in a thermal equilibrium with each other.

**The boiling point:** The temperature at which the liquid and vapor phases are in equilibrium with each other at a specified pressure. At the boiling point, the transition from the liquid to the gaseous phase occurs in a pure substance.

**The freezing point** is the exact temperature at which a liquid becomes a solid. For water, the freezing point is 32 degrees Fahrenheit or 0 degrees Celsius. The term freezing point describes a moment of transition, much as the melting point captures the moment when ice turns from a solid to a liquid.

**Melting pot:** a pot in which metals or other materials are melted and mixed

**Boiling pot:** a rounded or cylindrical container, typically of metal, used for cooking.

**What is phase change?**

Matter exists chiefly in four forms: solid, liquid, gas, and plasma. The conversion of matter from one state to another is called a phase change. This process occurs when a large amount of energy is gained or lost. Phase change also depends on factors like pressure and temperature.