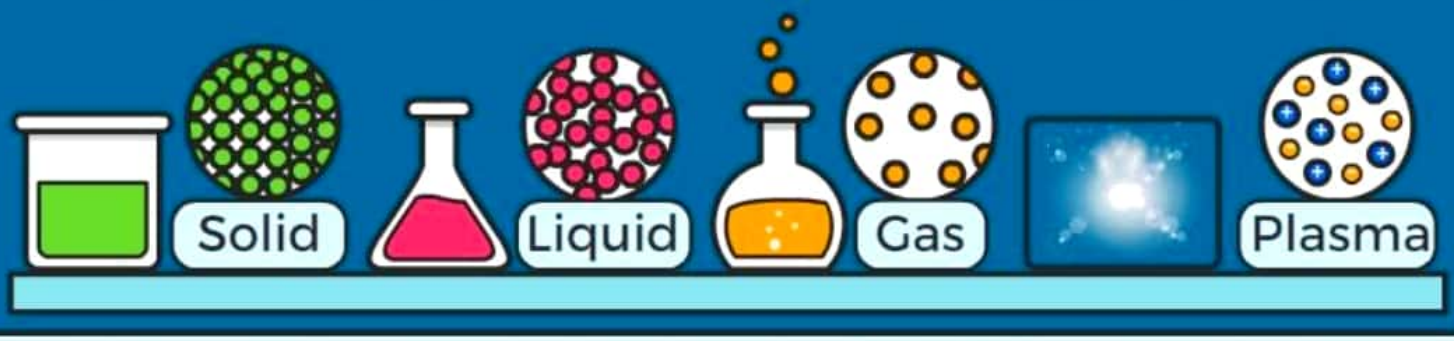
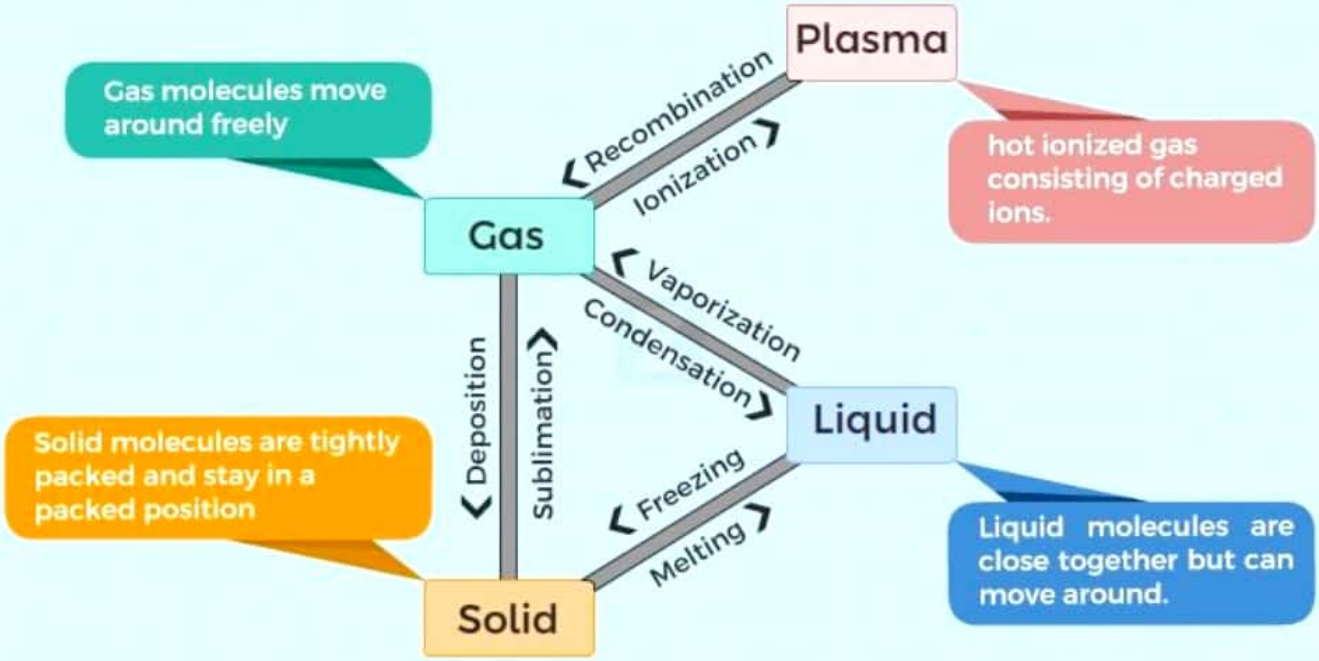
STATES OF MATTER





PHYSICAL STATE

SOLID

The molecules that make up a solid are arranged in regular, repeating pattern. They are held firmly in place but can vibrate within a limited area.

LIQUID

The molecules that make up a liquid flow easily around one another. They are kept from flying apart by attractive forces between them. Liquids assume the shape of their containers.

GAS

The molecules that make up a gas fly in all directions at great speeds. They are so far apart that the attractive forces between them are insignificant.

PLASMA

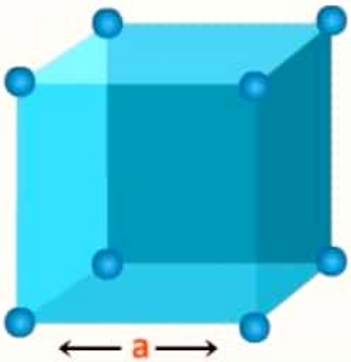
At very high temperatures of stars, atoms lose their electrons. The mixture of electrons and nuclei that results is the plasma state of matter.

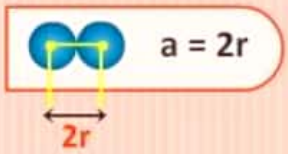
Bravais Lattices Of Crystals

Primitive Cube

- 8 - Corner atoms = $8 \times \frac{1}{8} = 1$

Total Number of atoms = 1





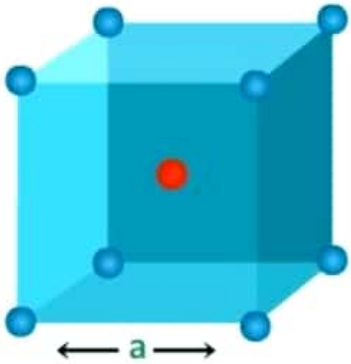
$$\text{Packing Fraction} = \frac{\text{Volume of atoms}}{\text{Volume of cube}}$$

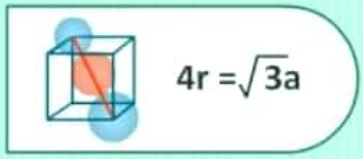
$$= 0.52$$

Body Centered Cube

- 8 - Corner atoms = $8 \times \frac{1}{8} = 1$
- Center atoms = 1

Total Number of atoms = 2





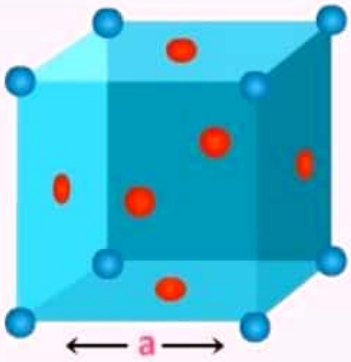
$$\text{Packing Fraction} = \frac{\text{Volume of atoms}}{\text{Volume of cube}}$$

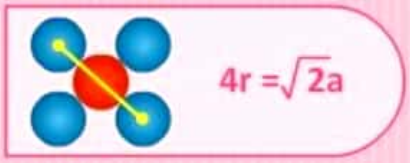
$$= 0.68$$

Face Centered Cube

- 8 - Corner atoms = $8 \times \frac{1}{8} = 1$
- 6 - Face atoms = $6 \times \frac{1}{2} = 3$

Total Number of atoms = 4





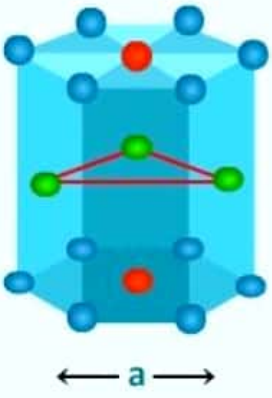
$$\text{Packing Fraction} = \frac{\text{Volume of atoms}}{\text{Volume of cube}}$$

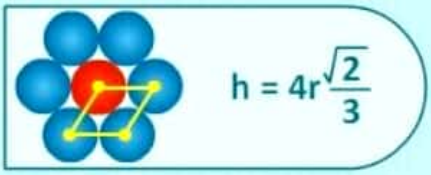
$$= 0.74$$

Hexagonal Close Packed

- 12 - Side corner = $12 \times \frac{1}{6} = 2$
- 2 - Face side atoms = $2 \times \frac{1}{2} = 1$
- 3 - atoms inside $3 \times 1 = 3$

Total Number of atoms = 6





$$\text{Packing Fraction} = \frac{\text{Volume of atoms}}{\text{Volume of hexagonal}}$$

$$= 0.74$$