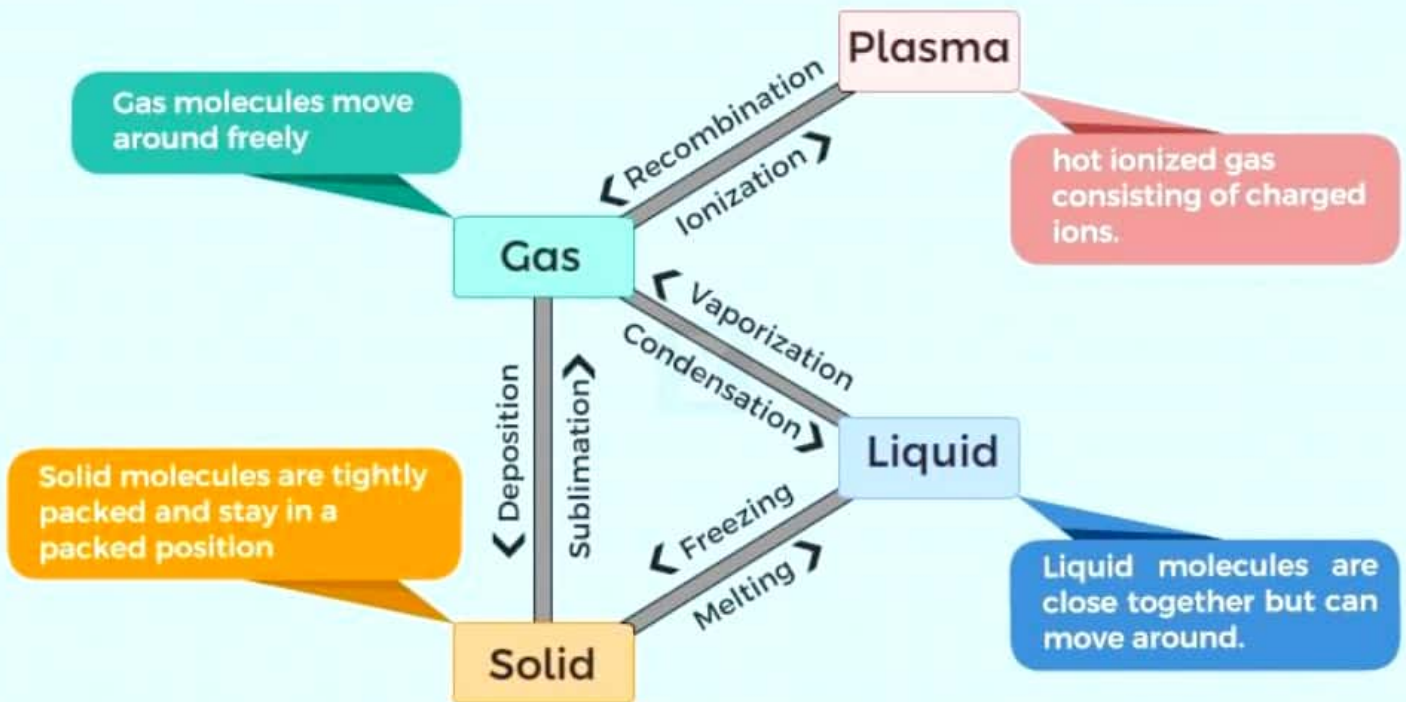


# STATES OF MATTER



## 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.

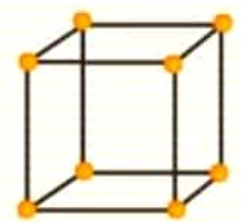
### PLASMA



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



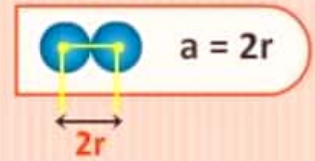
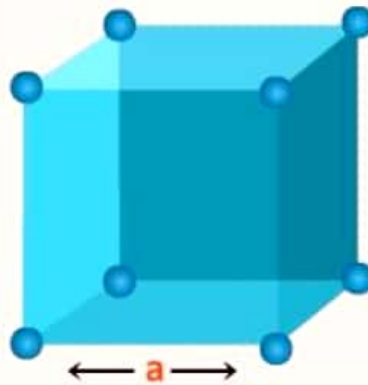
# Bravais Lattices Of Crystals



## Primitive Cube

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

Total Number of atoms = 1



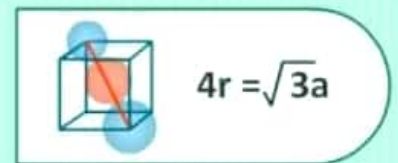
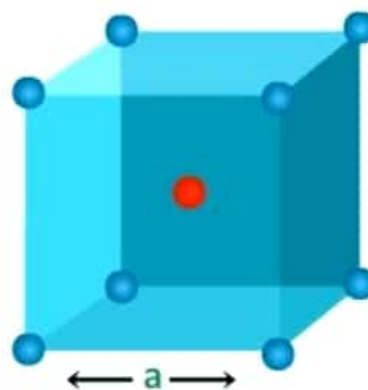
Packing Fraction =  $\frac{\text{Volume of atoms}}{\text{Volume of cube}}$   
= 0.52

## Body Centered Cube

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

Center atoms = 1

Total Number of atoms = 2



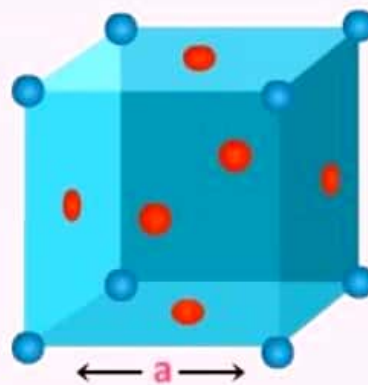
Packing Fraction =  $\frac{\text{Volume of atoms}}{\text{Volume of cube}}$   
= 0.68

## 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



Packing Fraction =  $\frac{\text{Volume of atoms}}{\text{Volume of cube}}$   
= 0.74

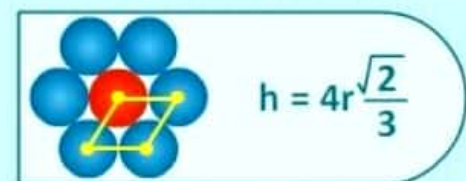
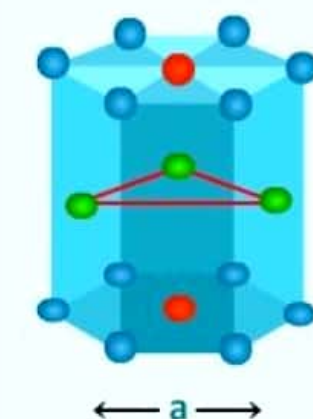
## Hexagonal Close Packed

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



Packing Fraction =  $\frac{\text{Volume of atoms}}{\text{Volume of hexagonal}}$   
= 0.74