Phases of Matter

Particles, which may be atoms or molecules, move around. Their average speed is higher at high temperature and slower at low temperature. Particles also stick to each other. If their motion is slow enough this stickiness forces them to be a liquid or solid. If they move too fast then stickiness fails, the particles fly apart and are a gas.

Solid

In a solid all the particles are touching other particles.

Often, the particles have a symmetrical, regular pattern in their arrangement.

On average particles in a solid do not move — they vibrate in place, faster at higher temperatures.

Solids cannot be compressed to smaller volumes.

Iron
Fe

Carbon Dioxide
CO_2

Melting

Freezing

Liquid

In a liquid all the particles are touching other particles.

Particles are randomly arranged and in constant motion.

Because they are jammed together particles in a liquid do not move far before colliding with other particles. At higher temperatures they move faster.

Liquids also cannot be compressed.

Iron
Fe

Water
H_2O

(Arrows show motion)

Evaporating

Condensing

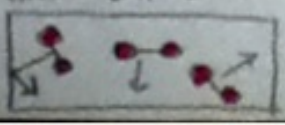
Gas

In a gas no particles touch other particles.

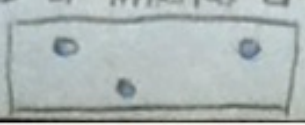
Particles are in constant motion with huge spaces between them.

Gas particles move more slowly at low temperature than at high.

Gases can easily be compressed by making empty spaces smaller.



Oxygen
O_2



Argon
Ar