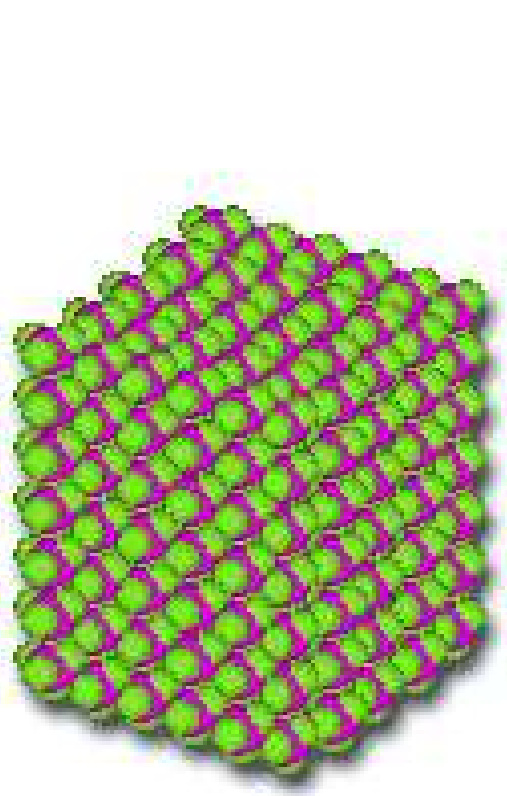
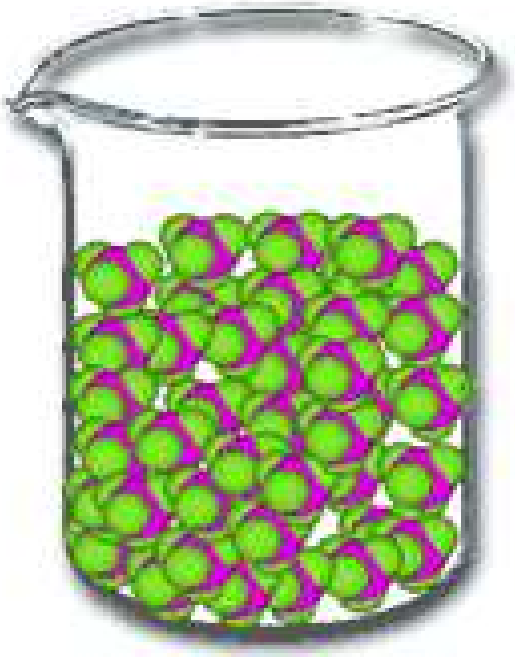
States of Matter and Phase Changes
Kinetic Theory



Solid



Liquid

Gas

Kinetic Theory

Forces of Attraction

States of Matter

Phase Change

Solid, Liquid, Gas

Temperature

Evaporation

Condensation

Boiling

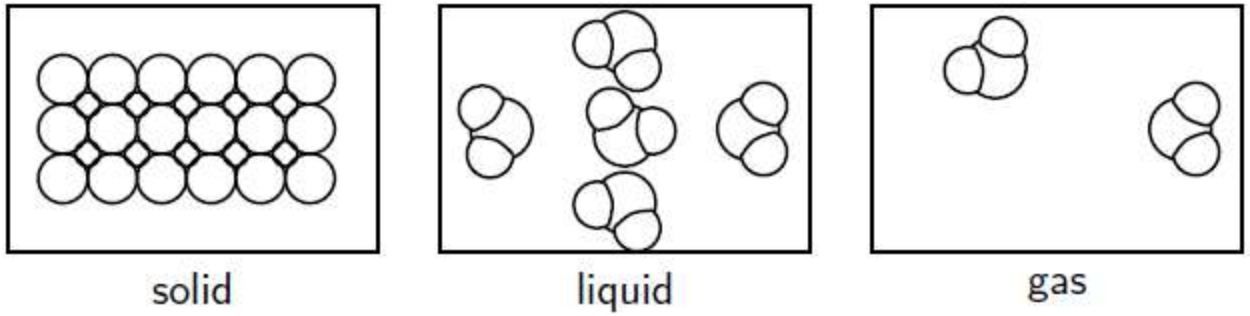
Melting

Sublimation

Deposition

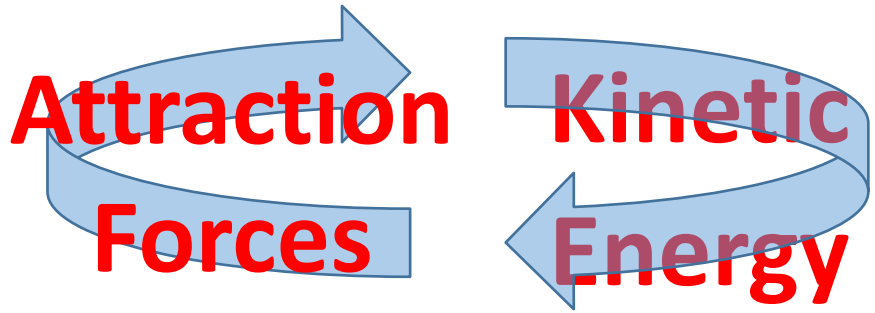
Kinetic Theory

The 3 pillars of KE



1. All matter is composed of small particles (atoms, molecules, or ions).
2. They are in constant, random motion.
3. These molecules constantly collide with each other and their surroundings.

Forces of Attraction



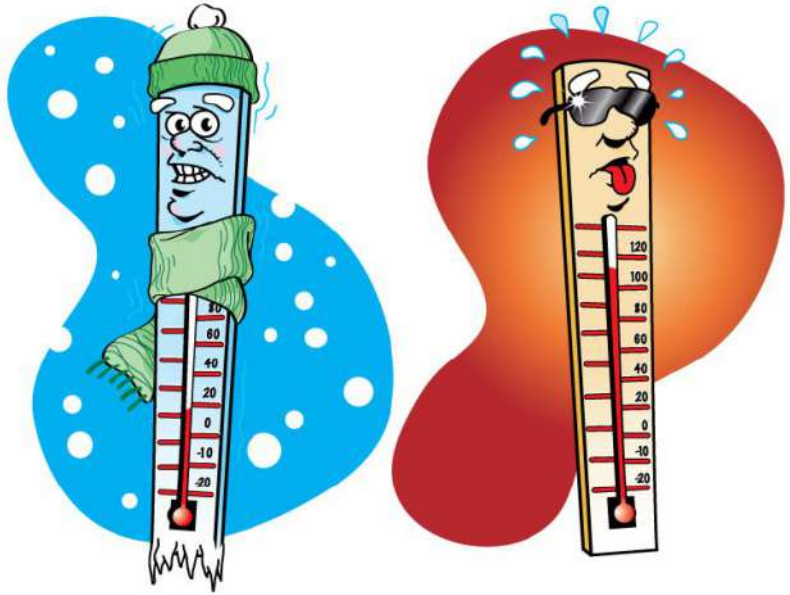
According to the kinetic theory of matter, the state (phase) of a substance is determined by the interplay of two opposing forces within a substance.

Kinetic energy pulls particles apart while **forces of attraction** hold them together.

Phases of Matter

The phases or states of **matter** can exist in four ***phases***; solid, liquid, gas, and plasma. Whether a substance is a solid, liquid or gas depends on the kinetic energy and the atomic forces of attraction holding the particles together.

Temperature



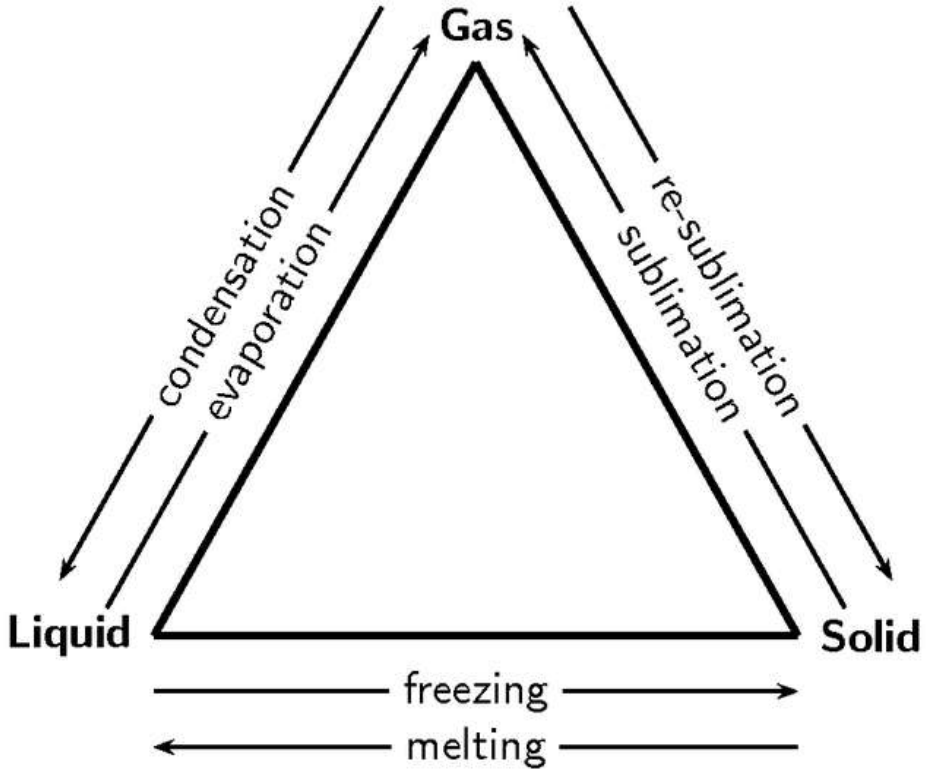
Definition: is a measure of the average kinetic energy of the particles of a substances.

The specific form of KE concerning *Kinetic Theory of Matter* is thermal energy.

Thermal energy is particle motion at the molecular scale. Temperature is only the measure of this.

Temperature cont.

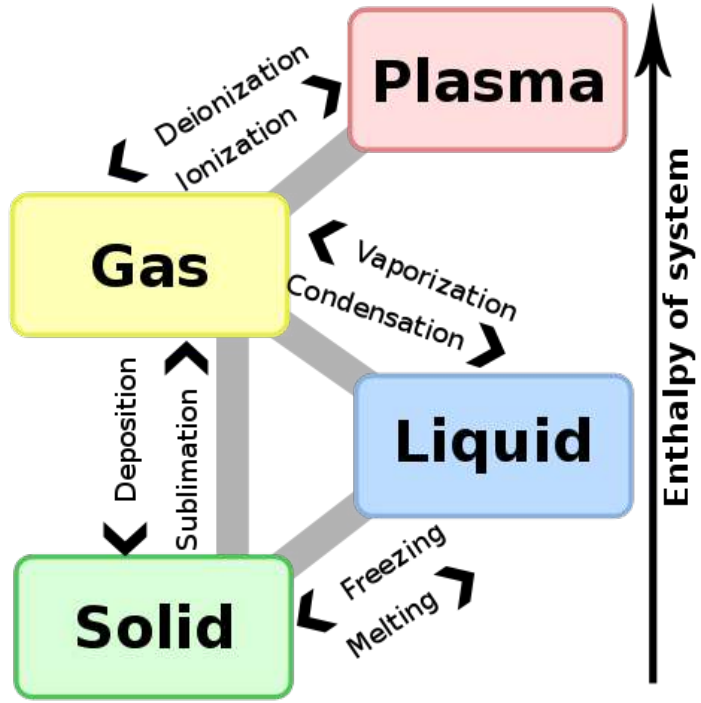
During a phase change, temperature of the matter remains constant. It does not change.



However when matter is a particular state "say gas" the temperature can range dramatically.

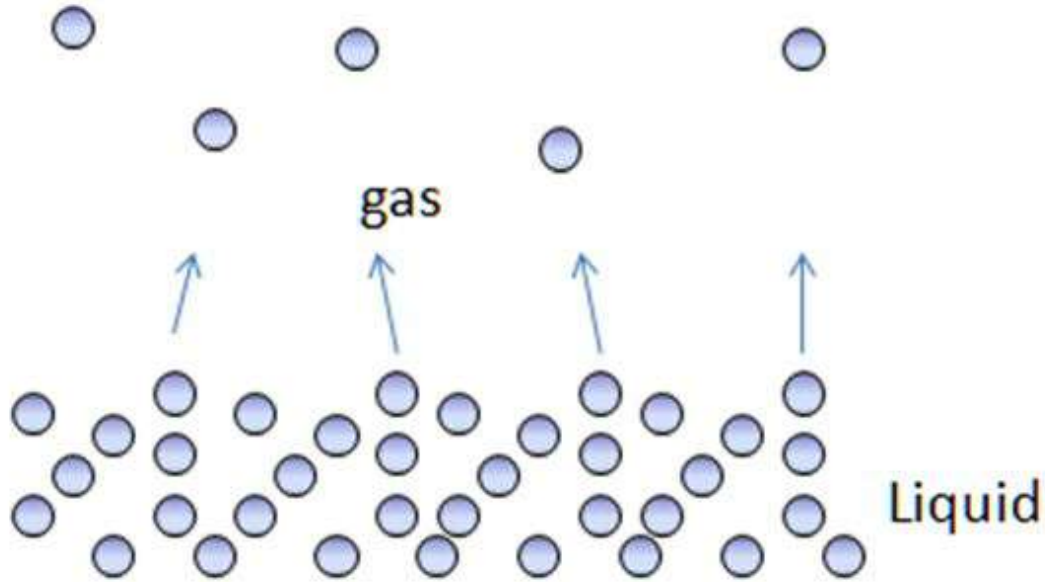
Phase Change

Definition: this is the transformation of one state of matter into another.



Relative thermal energy is what **causes** matter to change phases.

Temperature is the **effect** that we measure not what drives the change.



Definition: the change from a liquid to a gas at the surface of a liquid.

Definition: the phase change of a substance from a gas or vapor to a liquid.

Ex: **cloud formation** / What has to happen ?

Relative humidity rises to 100%

Saturation of the air occurs

Condensing nuclei must be present

How Do They Compare In Size?

Definition: the action of bringing a liquid to the temperature at which it bubbles and turns to vapor. Liquid to gas.

Ex: (for fresh water at sea level) at 212°F (100°C).

Definition: the process of becoming liquid or to be liquefied by heat. Solid to liquid.

https://youtu.be/7_p9LOTUIDC

Defined: is the process by which a solid changes phase and turns directly into a gas without passing through the liquid phase.

Ex: dry ice, snow high up in the mtns

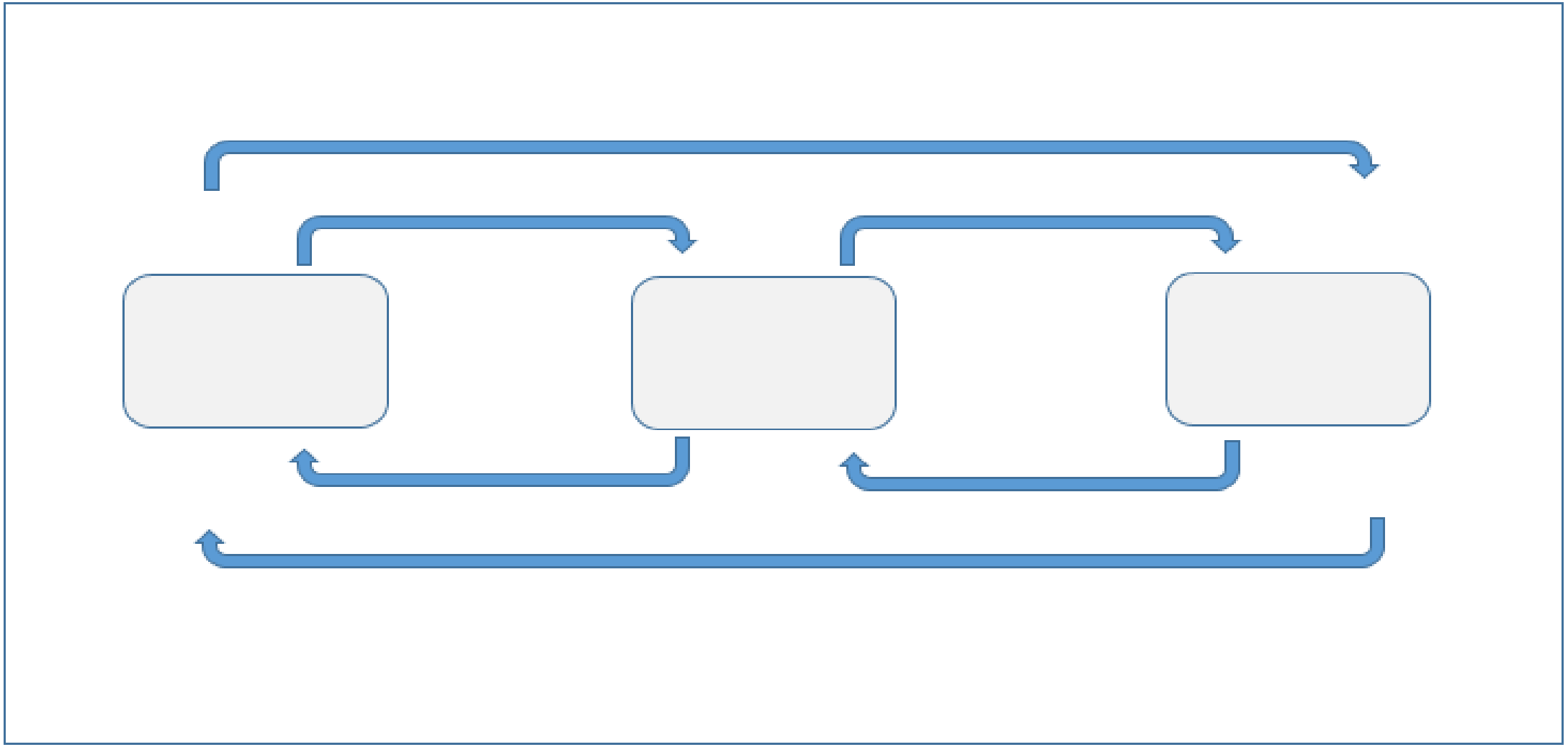
https://youtu.be/6JzQ08AGuhI <= dry ice video

Defined: is the process by which a gas changes phase and turns directly into a solid without passing through the liquid phase.

Ex: hail, frost, snow

https://youtu.be/rM04U5BO3Ug **<= nitrogen gas to nitrogen solid**

PHASE CHANGE – STATES OF MATTER NOTES



DIRECTIONS:

Fill in the 3 States/Phases of Matter in the Blocks above.

Then label the arrows with the appropriate phase change terminology.

GRAPHING PHASE CHANGES OF MATTER