

# Chemistry Notes 2013

## Particulate Nature of Matter

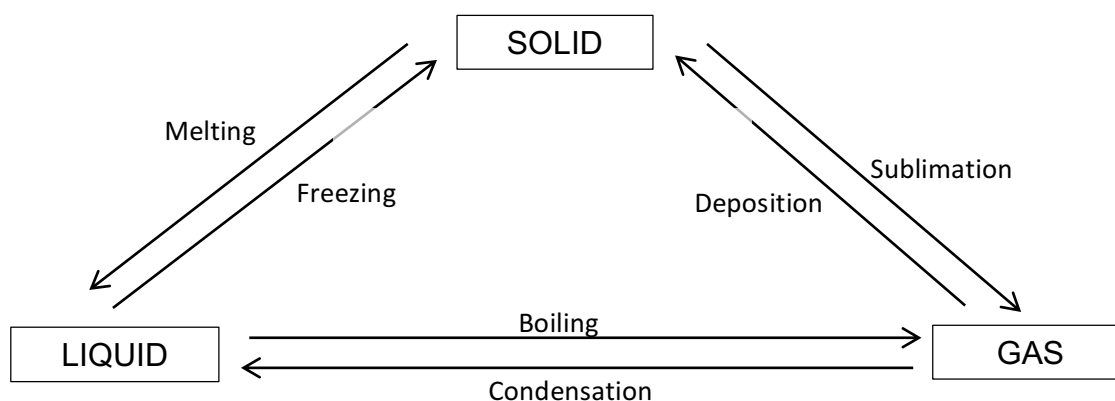
### The Kinetic Theory

1. All matter is made up of atoms.
2. Atoms/molecules have energy of motion [vibration and/or linear motion of translation] that we feel as temperature.
3. The pressure of a gas is due to the motion of the molecules of gas striking the object bearing that pressure.
4. There is a very large distance between the molecules of a gas compared to the size of the molecule such that the size of a molecule can be considered negligible.

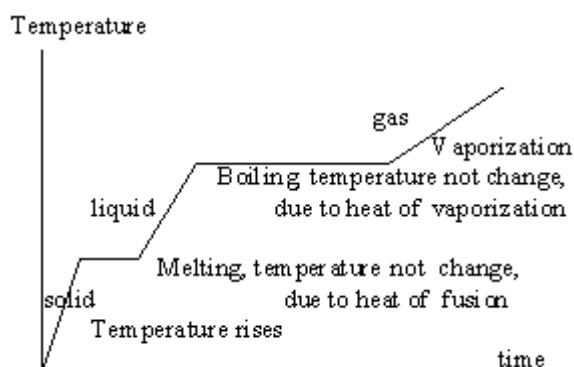
### The States of Matter

	<b>Solid</b>	<b>Liquid</b>	<b>Gas</b>
Energy Content	Low	Moderate	High
Arrangement of Particles	Close together in an orderly arrangement	Close together but no orderly arrangement	Far apart and no orderly arrangement
Motion	Vibration	Vibration and translation	Vibration and Translation
Shape and Volume	Has fixed shape and volume	No fixed shape [takes the shape of the container] but has fixed volume	No fixed shape and no fixed volume [fills up the container]
Forces of attraction between particles	Strong	Moderate	Weak or none
Compressible	No	No	Yes

### Phase Transition



### Heat Curve



The heat curve on the left hand side illustrates the corresponding changes in energy and temperature as it undergoes a phase transition between the liquid and gas states.

Thus, at 100 degrees Celsius under normal conditions, liquid water will begin to undergo a phase transition into gas

phase. At the point, energy introduced to the liquid will not go into increasing the temperature; it will be used to send molecules of water into the gas state. Thus, no matter how high the flame is on the stove, a pot of boiling water will remain at 100 degrees Celsius until all the water has undergone transition into the gas phase.

### Evidence for Particulate Nature of Matter

1. The phenomenon of Diffusion is often cited as one of the evidences that matter is particulate in nature.
2. Diffusion is the movement of particles from an area of high concentration to an area of low/lower concentration.

The rate of diffusion is affected by:

- ✚ Temperature: Higher temperatures will cause the particles to vibrate more vigorously; diffusion rate will thus be higher.
- ✚ Mass of particle: The greater the mass, the slower the particles diffuse. Vice versa.