

Chemistry

Chapter 13 – States of Matter NOTES

Name _____

Date _____ Block _____

_____ **Theory** – particles of matter (atoms, molecules, atomic parts) are always in constant motion.

Temperature – measure of the average _____.

- **Zero Kelvin means no motion of molecules or atoms.**
- This is minus 273°C.
- Formula: $K = ^\circ C + 273$

Gas – no definite _____ or _____, particles move rapidly.

- **Pressure** – result of _____ of gas molecules or atoms with an object (i.e. the side of its container, the surfaces on the Earth).
- **Atmospheric pressure** - specifically the pressure caused by gas molecules (Air on Earth) and objects on the surface of the planet.
 - *Decreases with increasing altitude!*
- **Barometer** – measures _____ pressure –
 - **Standard temperature** is _____
 - **Standard pressure** is _____
 - 1 atm (atmosphere)
 - 760 mm Hg
 - 760 torr
 - 101.3 kPa (kilo Pascal)
- **Vacuum** – An empty space with _____ (no pressure).
- **Converting Pressure units:** $1 \text{ atm} = 760 \text{ mm Hg} = 101.3 \text{ kPa} = 760 \text{ torr}$
 - 1.50 atm
 - In kPa?

 - In mm Hg?
 - 190 mm Hg
 - In kPa?

 - In atm?

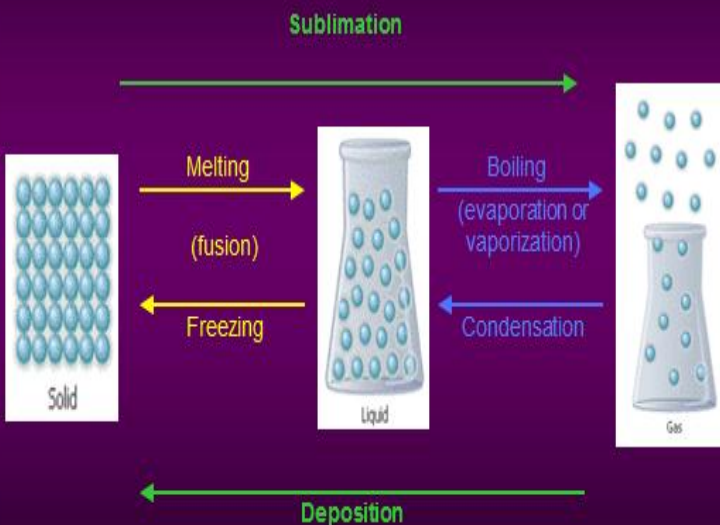
Liquids – have no definite _____, but have definite volume

- **Evaporation or _____** – conversion of liquid to gas because particles of the liquid gain _____ to overcome _____ forces between particles.
- **Vapor pressure** – evaporated gas particles collide with the walls of a sealed, partially filled container
- **Boiling point** – temperature at which the _____ is equal to the _____ pressure.
- **Normal boiling point** – boiling point at _____ pressure (101.3 kPa)
 - Water boils at _____ at standard pressure.
 - Water boils at _____ temperatures with the pressure is _____.
- **Condensation** – conversion of gas to _____
 - **Heat of vaporization** – _____ given off when a liquid condenses/vaporizes.

Solids – have definite shape and volume

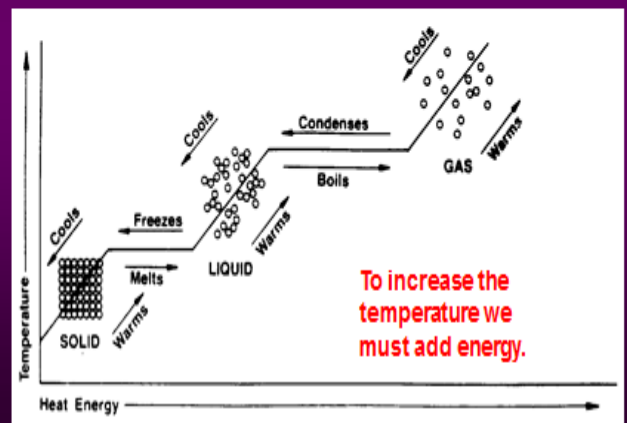
- **Crystal** – atoms, ions or molecules are arranged in an orderly fashion.
 - **Unit cell** – the _____ of particles that retain the geometric shape
 - **Allotrope** – two or more molecular forms of the _____ element in the same state
 - **Amorphous solid** – lack _____ internal structure (i.e. glass)
- **Melting point** – temperature which a solid changes to _____
- **Freezing point** – temperature which a liquid changes to _____
 - **Heat of crystallization/fusion** – _____ given off when a liquid freezes/melts.
- **Sublimation** – the change of a substance from a solid directly to a _____

Phase Changes



Heating/Cooling Curve

- Shows the temperature and energy of a substance over time as it changes from a solid to a gas



Extras

- **Heat \neq Temperature:** heat is a _____ of energy and requires not just an observation; but requires a _____ involving mass and:
- **Specific Heat** _____ – A quantity of heat unit per mass unit.
- Mixtures of different solids, liquids and gas.
 - **Heat of solution** – energy _____ when a substance is dissolved in another liquid. The solution is generally aqueous.
 - **Freezing point depression/boiling point elevation** – occurs when matter attempts to go through a phase change while being mixed with another kind of matter. This is a _____ property, as the effect depends on how much other matter is added, generally in the form of moles of particles.
- Energy changes:
 - **Endothermic process** – energy is determined to be _____ into one substance/system from its surroundings. Values therefore are seen as **positive**, +.
 - **Exothermic process** – energy is determined to be _____ from one substance/system to its surroundings. Values therefore are seen as **negative**, -.