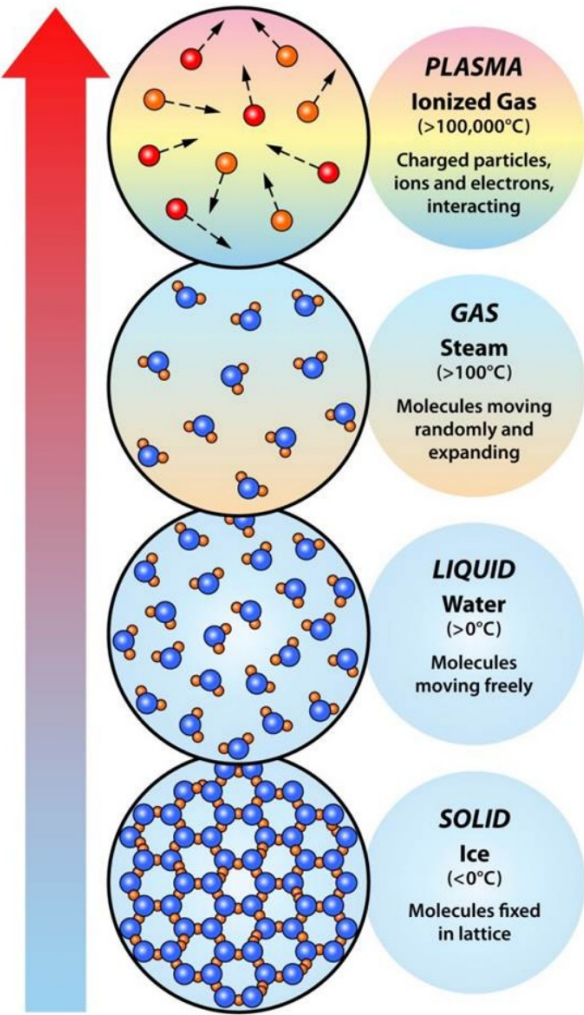


Lesson Overview

Phase Diagrams

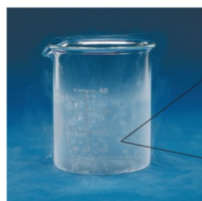
Objective: The student will be able to qualitatively and quantitatively describe the processes of phase changes.

States of Matter

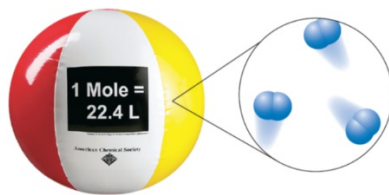
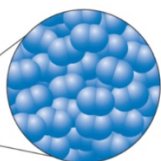


Postulates of Kinetic Molecular Theory

1. All gas molecules are considered to be “point” masses. **(Mass)**
2. The average kinetic energy of any gas is a function of its absolute temperature. **(Energy)**
3. Gas particles move in a rapid, random, straight-line motion. **(Motion)**
4. The volume of the gas molecules are negligible compared to the volume in which they are contained. **(Volume)**
5. Attractive and repulsive forces between gas molecules are negligible. **(Collisions)**

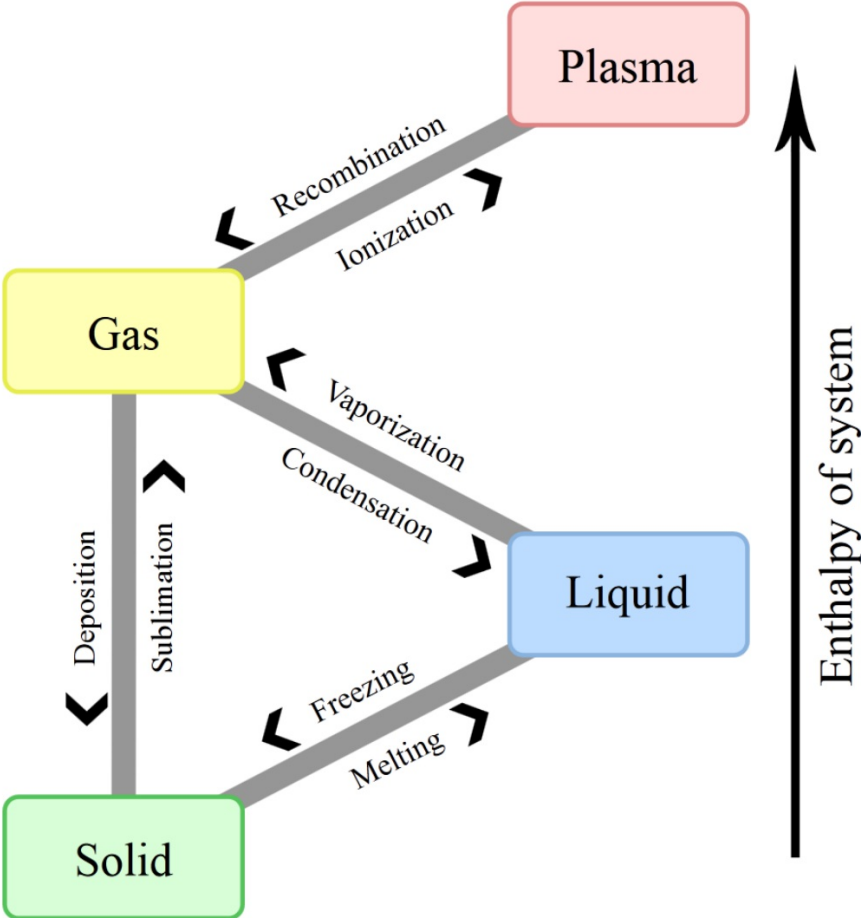


(a)

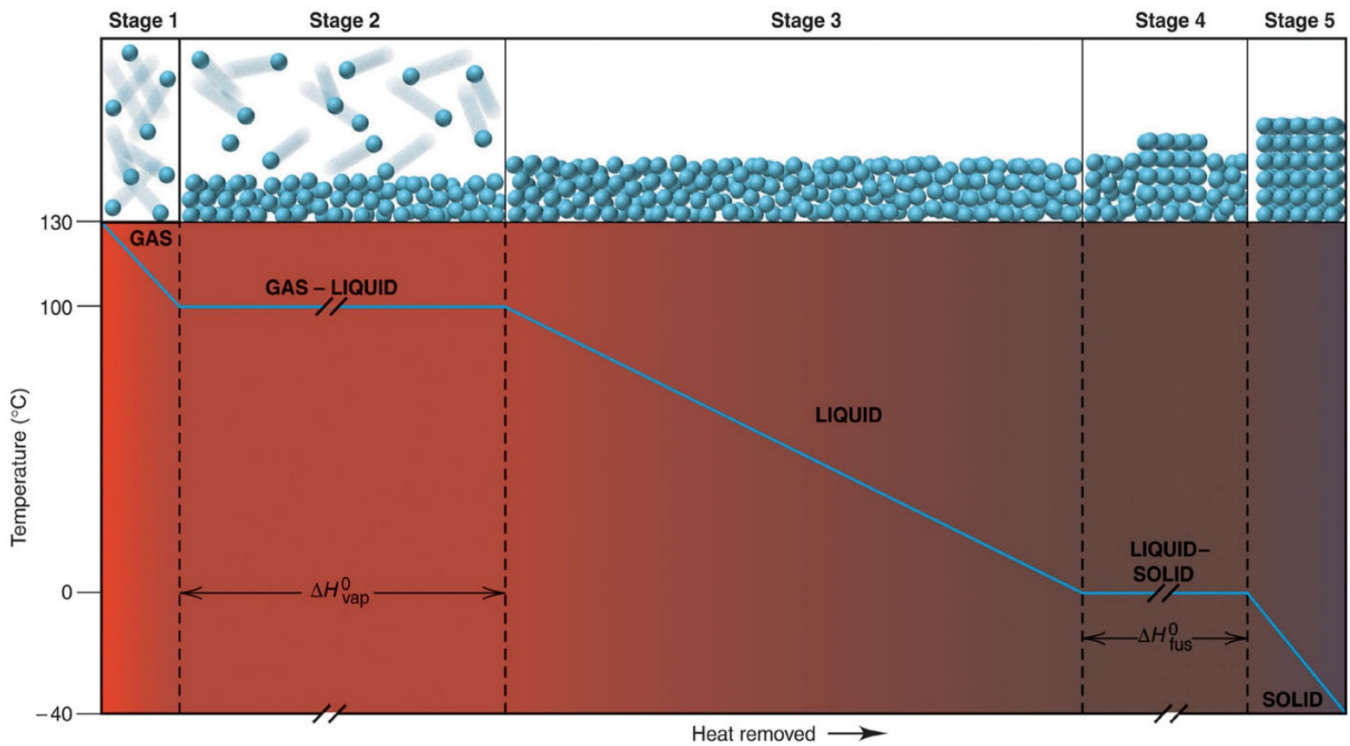


(b)

The Four Fundamental Phases



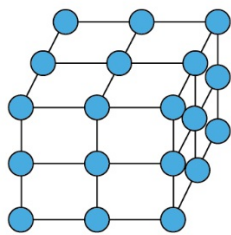
Energy of particles



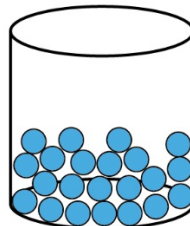
Essential Question: What is happening on the molecular level? (Phase changes, IMFs)

States of Matter

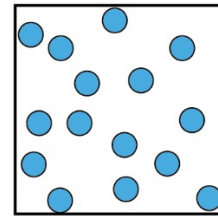
- = atom
- ⊕ = nucleus
- ⊖ = electron



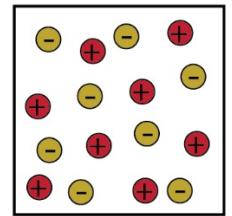
Solid



Liquid



Gas



Plasma

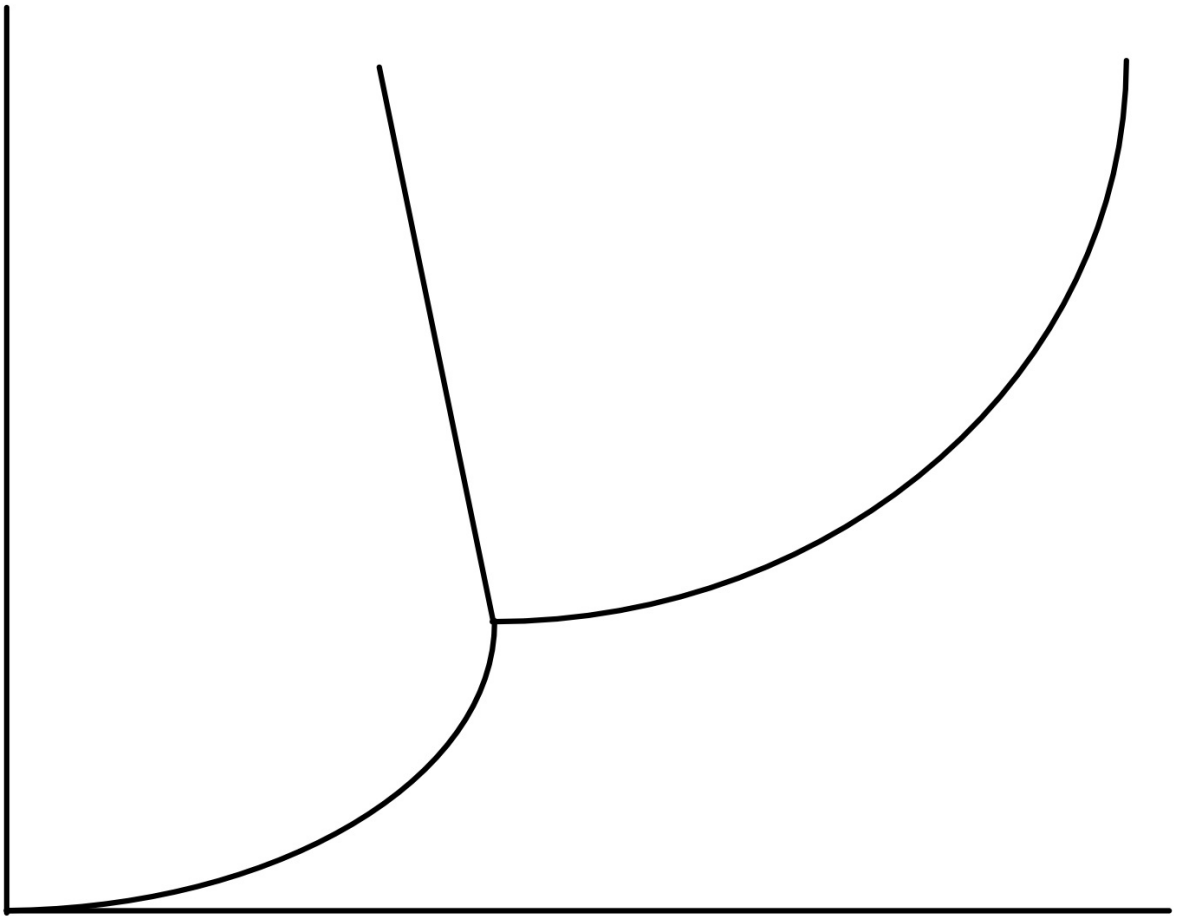


Properties of Solids, Liquids & Gases

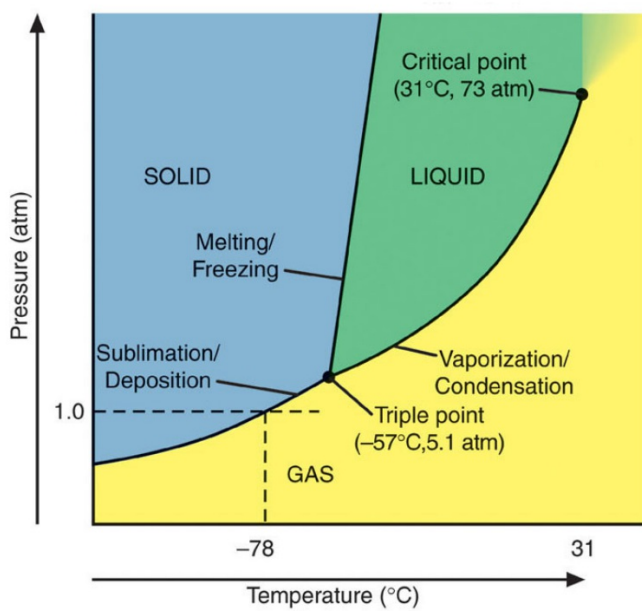
- All particles are in constant motion, have a density

Solids	Liquids	Gases
<ul style="list-style-type: none"> ○ Particles very close together ○ Highest density ○ Lowest kinetic energy ○ Least amount of motion ○ Definite shape & volume ○ Not very affected by environmental conditions (i.e. physical changes) 	<ul style="list-style-type: none"> ○ Particles loosely held together ○ Moderate density ○ Moderate kinetic energy ○ Some motion ○ Conforms to shape of container, definite volume ○ Fixed volume ○ Expand & vaporize when heated ○ Fluid (less than gases) 	<ul style="list-style-type: none"> ○ Particles very far apart ○ Least dense ○ Most kinetic energy ○ High amount of motion ○ No definite shape or volume ○ No organization ○ Fluid

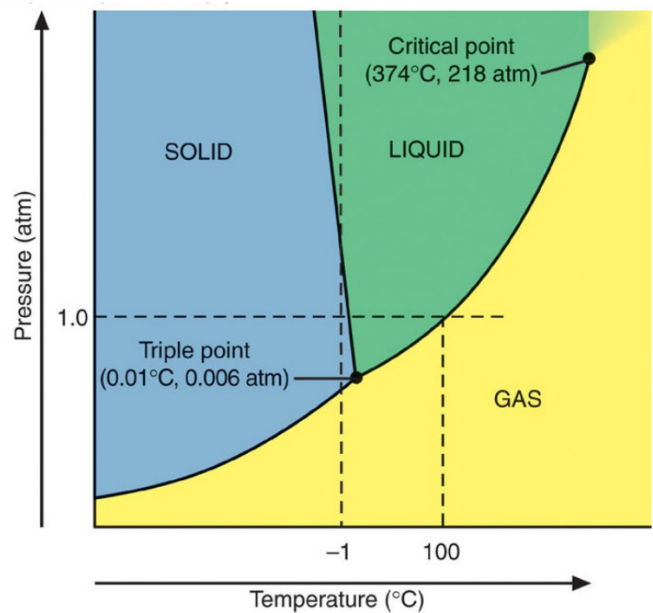
Phase Diagrams



Comparison of Phase Diagrams



CO_2



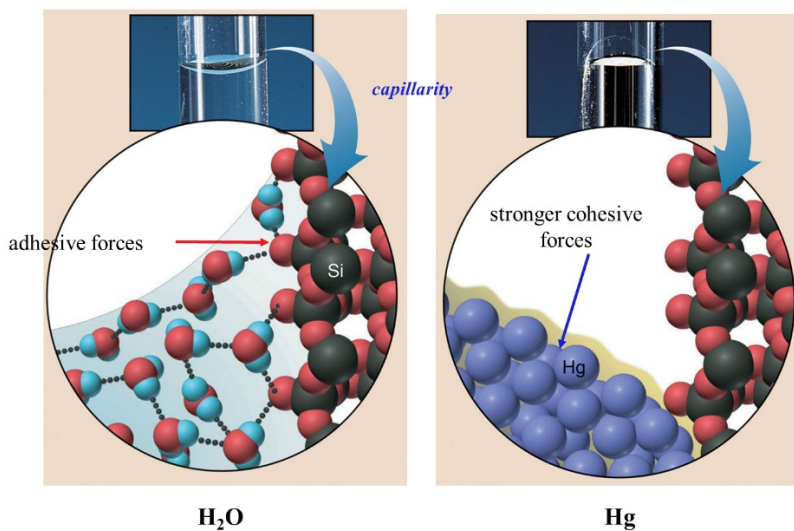
H_2O

The dominating entity between states of matter are the Intermolecular Forces

Properties of Liquids

viscosity, surface tension, capillary action

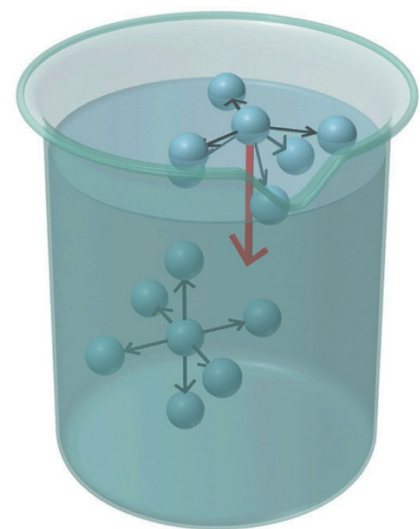
Viscosity is the resistance to flow.



H₂O

Hg

capillary action



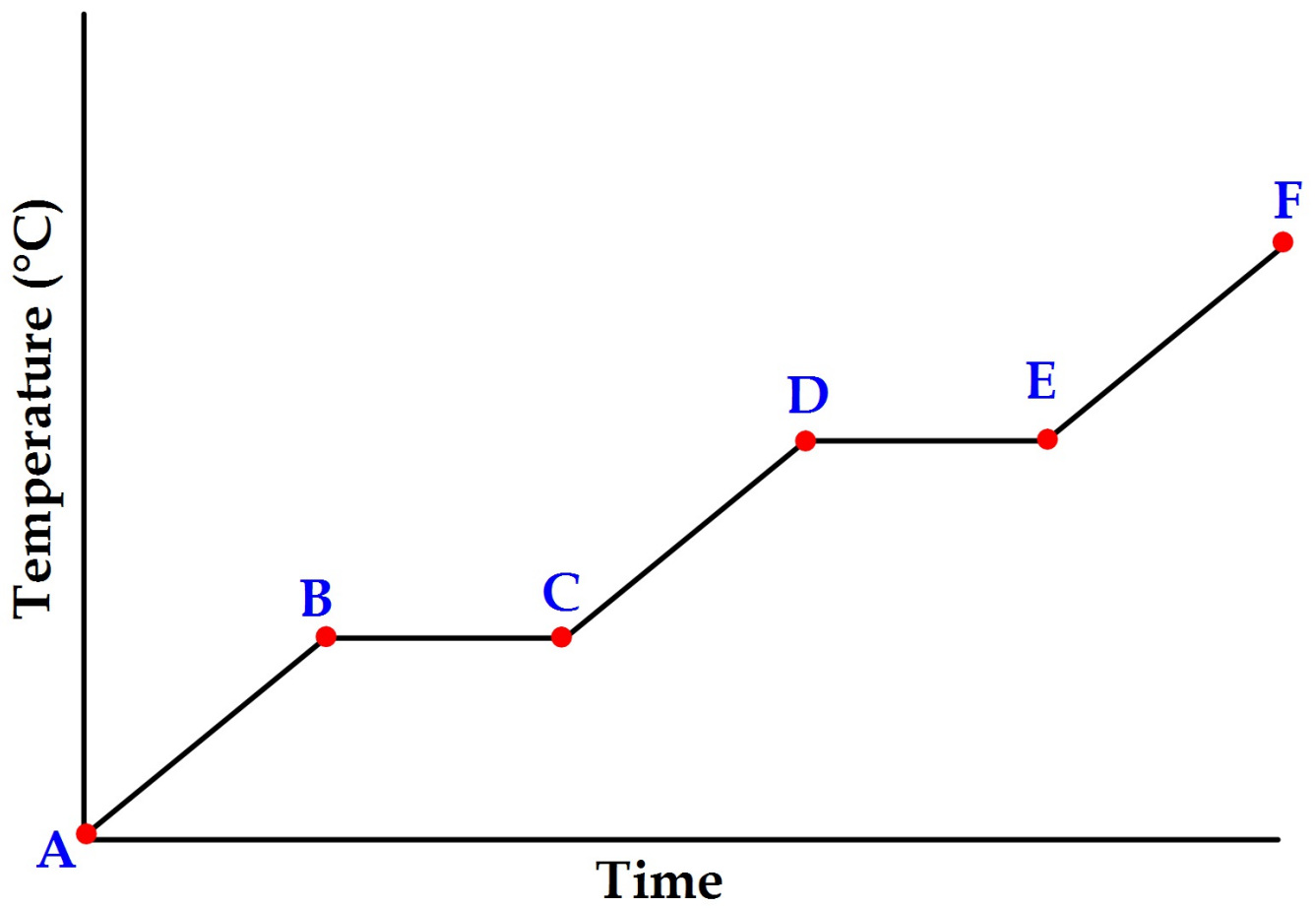
surface tension

Vapor Pressure

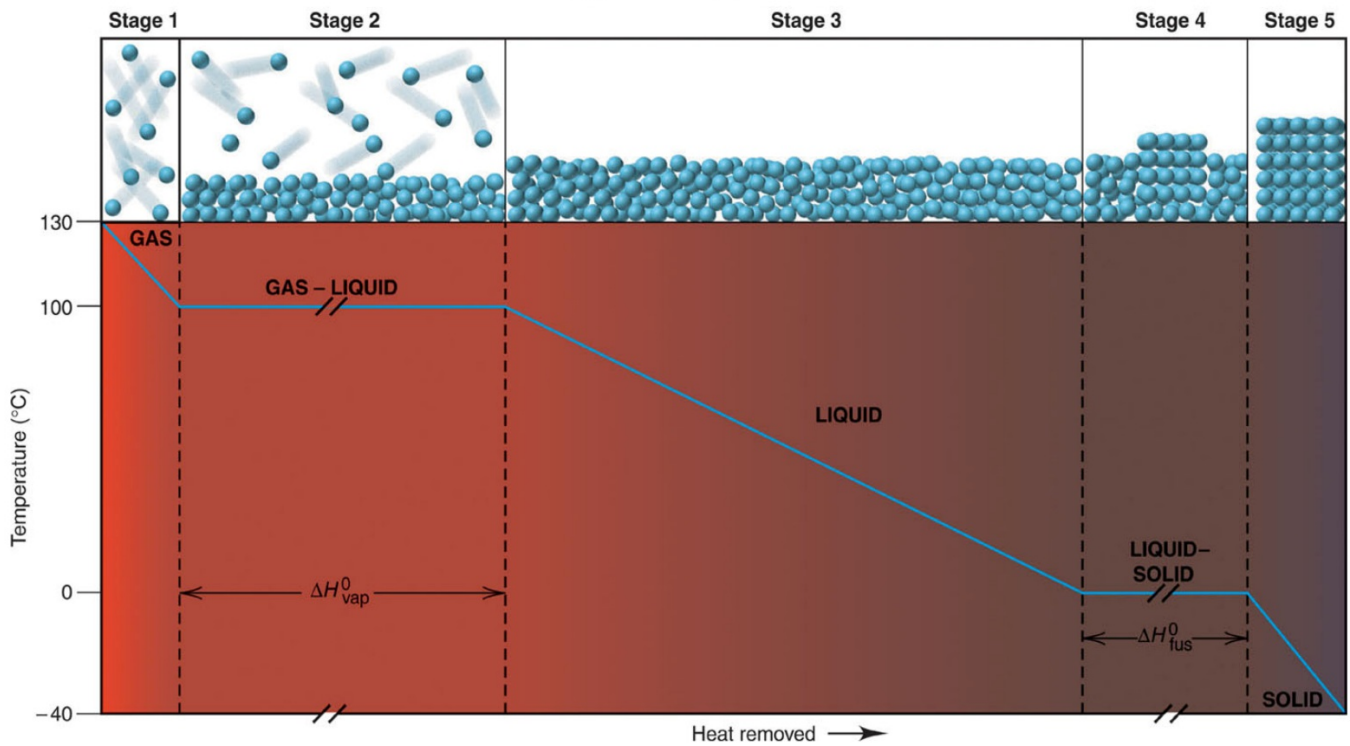
Concept, V.P. vs IMF, dynam. equilibrium



Change of State Problems



Energy of particles



Essential Question: What is happening on the molecular level? (Phase changes, IMFs)

Equations and Variables

$Q = mC\Delta T$	$Q = mH_f$	$Q = mH_v$
$Q =$ heat energy (J)	$H_f =$ heat of fusion (J/g)	$H_v =$ Heat of vaporization
$m =$ mass (g)		
$C =$ specific heat or heat capacity (J/g \cdot °C)		
$\Delta T =$ change in T (°C)		