Describe how the KMT explains the three main phases of matter.

Changes in State of Matter

**phase** - any part of a system that has uniform composition and properties

**condensation** - gas to a liquid

**equilibrium** - a dynamic condition in which two opposing changes occur at equal rates in a closed system

**equilibrium vapor pressure** - pressure exerted by a vapor in equilibrium with its corresponding liquid at a given temperature

an increase in temperature will increase the equilibrium vapor pressure

**volatile liquid** - liquids that evaporate readily

**boiling** - conversion of liquid to vapor both within the liquid and at the surface

**boiling point** - the temperature at which the equilibrium vapor pressure of the liquid equals the atmospheric pressure

**molar enthalpy of vaporization** - amount of energy as heat that is needed to vaporize one mole of liquid at the liquid's boiling point at constant pressure

**freezing** - liquid to a solid

**freezing point** - temperature at which the solid and liquid are in equilibrium at 1 atm

**molar enthalpy of fusion** - amount of energy as heat required to melt one mole of solid at the solid's melting point

**sublimation** - solid to gas

**deposition** - gas to solid

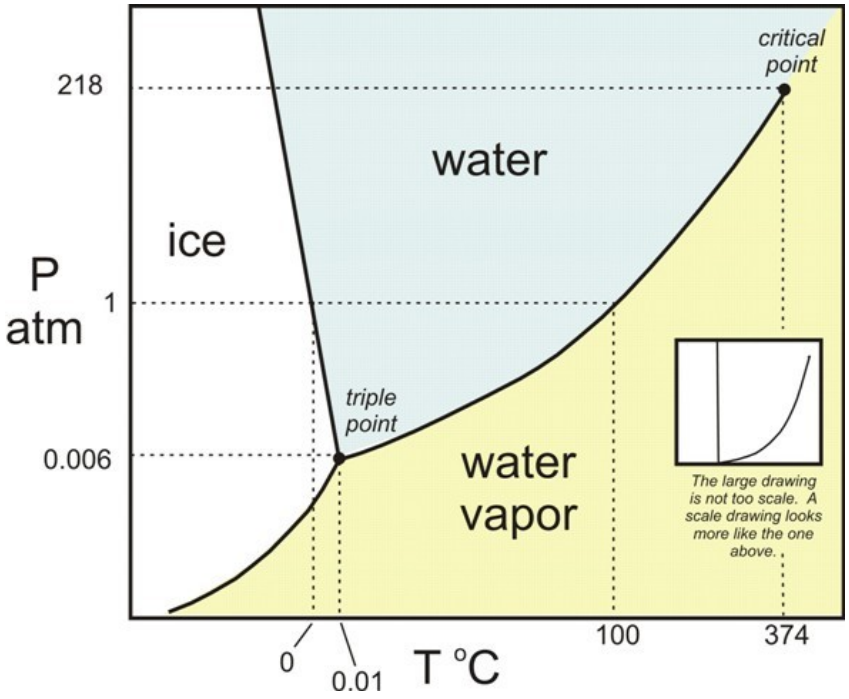
**phase diagram** - a graph of pressure vs temperature that shows the conditions which the phases of a substance can exist

**triple point** - solid, liquid, and gas coexist at the same temp / pressure

**critical point** - indicate critical temp and pressure

**critical temperature** - temp at which substance cannot exist in the liquid state

**critical pressure** - lowest pressure at which substance can be a liquid at the critical temperature



## Specific Heat

the heat required to raise the temperature of the unit mass of a given substance by a given amount (usually one degree).

Energy for changing water -

Molar enthalpy of fusion = 6.02 kJ / mol

Molar enthalpy of vaporization = 40.7 kJ / mol

Specific Heat liquid = 4.18 J / (g(K))

Specific Heat gas = 1.87 J / (g(K))

Specific Heat solid = 2.06 J / (g(K))

How much energy does it take to melt 36.5 g of water at 0 $^{o}$C?

How much energy does it take to freeze 402 mol of water at 0 $^{o}$C?

Does it take more or less energy to turn 25 g of water into steam or turn 0.75 mol of ice into water?

How much energy will it take to raise 26.4 g of water (l) 24 $^{o}$C?

How much energy does it take to turn 14.5 g of water (s) at -34 $^{o}$C into water (g) at 121$^{o}$C?

Determining Specific Heat from experimental data.

$Q = mc\Delta T$ where m is the mass

$\Delta T$ is the change in temp,

Q is heat energy

and c is specific heat

Equipment used in determining specific heat

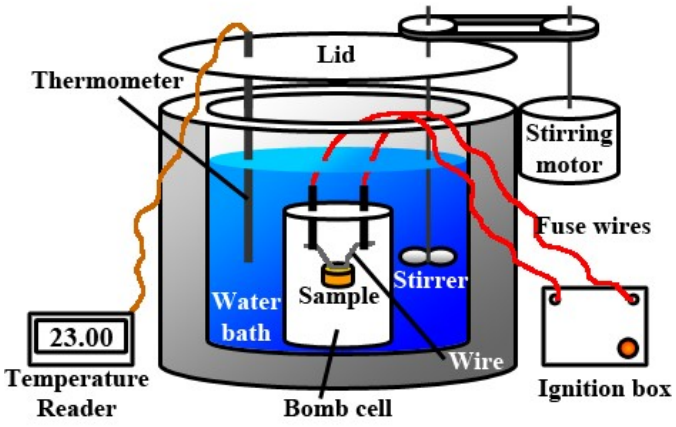
Thermometer

Water (with known specific heat)

Calorimeter (with known specific heat)

Substance with unknown c

Bomb Calorimetry



Calculations from experimental data

25.0 g of mercury is heated from 298 K to 428 K, and absorbs 455 joules of heat in the process. Calculate the heat capacity of mercury.