

Heat and Temperature



- Kinetic Molecular Theory
- Temperature
- Temperature Scales

Kinetic Molecular Theory

- Small basic units of structure – ATOMS
- Atoms cannot be
 - ◆ Divided
 - ◆ Created
 - ◆ Destroyed

Elements & Compounds

■ Elements

- ◆ similar group of atoms
- ◆ simple chemical structure
- ◆ O_2 , H_2

■ Compounds

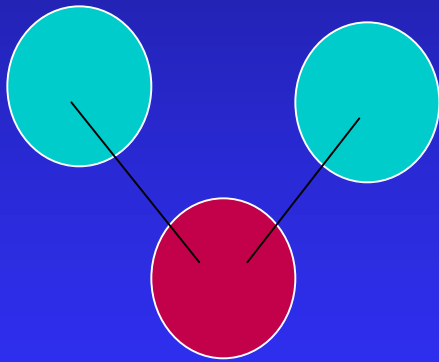
- ◆ Groups of tightly bound atoms
- ◆ Complex structure
- ◆ H_2O , NH_3 , Methane, Polymers

Molecules

■ Types of Molecules

- ◆ Mono-atomic : Helium gas
- ◆ Di-atomic : oxygen, hydrogen
- ◆ Tri-atomic, Poly atomic molecules

Molecular Interaction



- Forces of Interaction
 - ◆ Van der Waals forces
- Cohesion
 - ◆ Interaction between molecules of same type
 - ◆ Gases, Liquids, Solids
- Adhesion
 - ◆ Interaction between molecules of different type
 - ◆ Adhesives

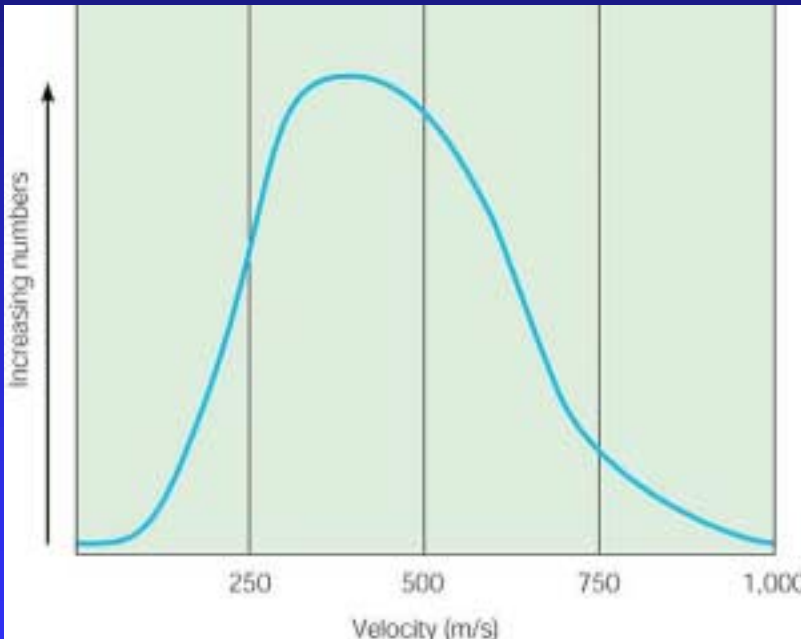
Molecular Motion

- Random Motion
- $KE = 1/2 mv^2$
- Kinetic Energy can be due to
 - ◆ Rotation
 - ◆ Translation
 - ◆ Vibration
- Molecular Collision \rightarrow Heat

Temperature

- Temperature is a “*measure of average kinetic energy of the molecule making up the substance*”

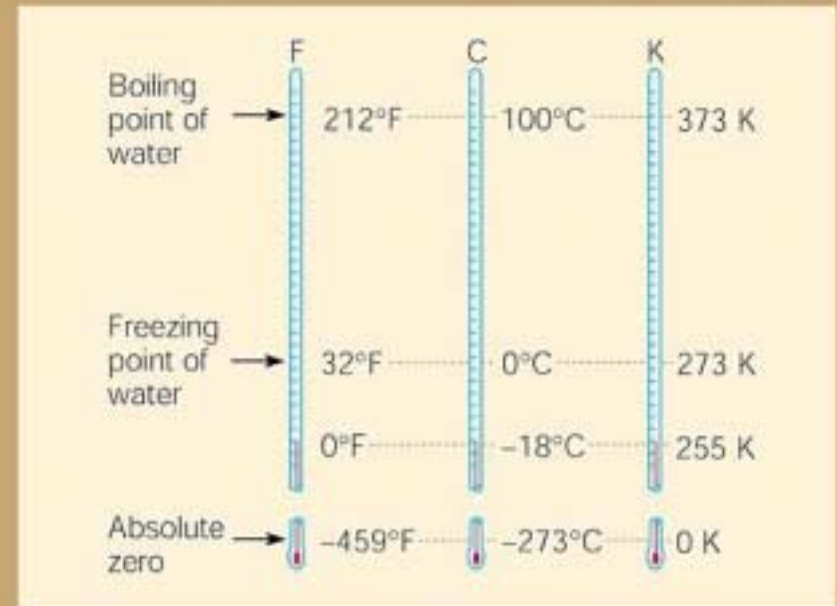
Temperature



- Molecular motion is random
- Kinetic molecular theory
 - ◆ Average velocity of molecules
 - ◆ Average kinetic energy
 - ◆ Average Temperature
 - ◆ Degree of hotness of coldness

Temperature Scales

- Fahrenheit Scale
- Celsius Scale
- Kelvin Scale
 - ◆ Absolute Scale



Temp Conversion

$$T_F = \frac{9}{5}T_c + 32^\circ$$

$$T_c = \frac{5}{9}(T_F - 32^\circ)$$

$$T_K = T_c + 273$$

Problem Session

■ Convert

◆ $0\text{ C} \rightarrow \text{F}$

◆ $273\text{ C} \rightarrow \text{K}$

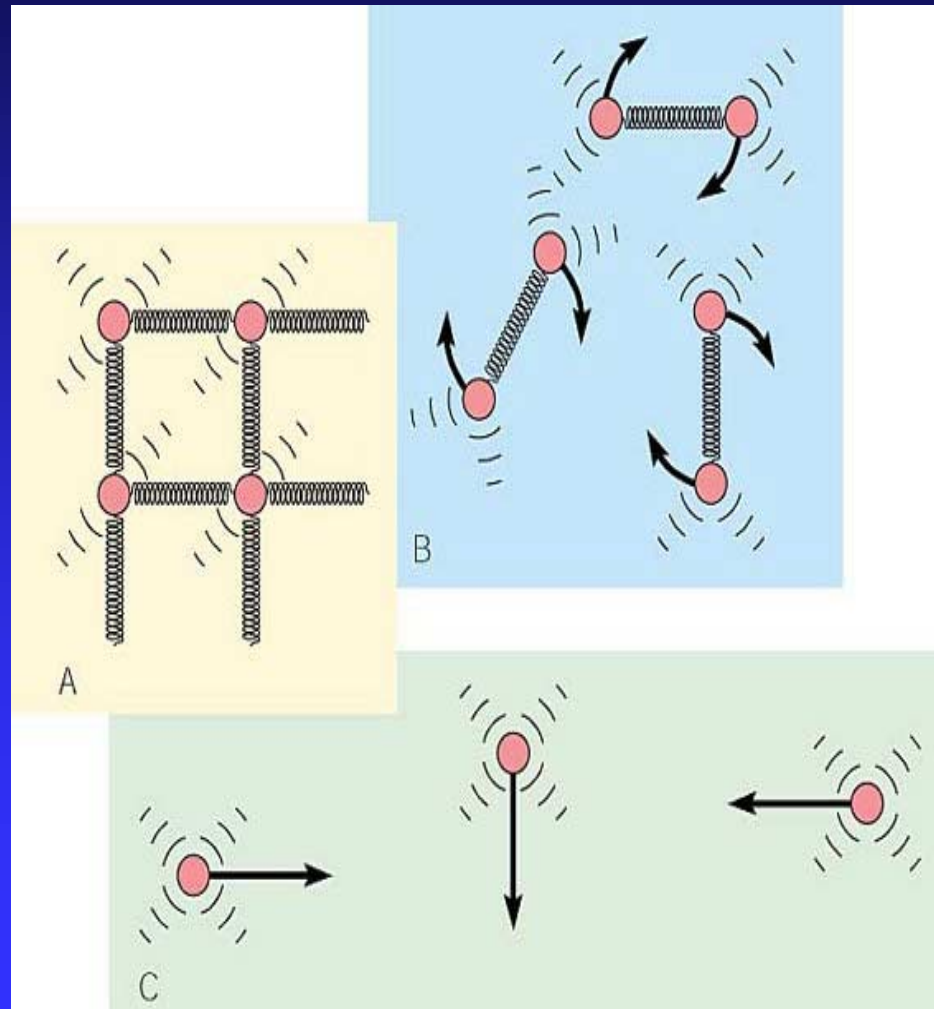
◆ $0\text{ K} \rightarrow \text{C}$

◆ $100\text{ C} \rightarrow \text{K}$

◆ $50\text{ F} \rightarrow \text{C}$

◆ Convert today's high temperature from $\text{F} \rightarrow \text{C}$

Phases of Mater



Phases of Matter

- Solids :
 - ◆ Have definite volume
 - ◆ occupy definite space
 - ◆ strong cohesive forces
- Liquids :
 - ◆ Have volume
 - ◆ Cohesive forces are intermediate in strength
- Gases :
 - ◆ Cohesive forces are the weakest
 - ◆ Molecules are free to move about in space