Date _____

CHAPTER: 4
GASES

KMTG

Gases
↳ Composed of Minute particles calle Molecules
→ Move straight until they collide with eachother & wall s
→ Collisions b/w are perfectly Elastic
→ Same mass & size (in one gas) of molecules
→ pressure is due to collisions of molecules
→ K.E ∝ Temperature
→ low pressure → Large distance b/w molecules
→ No attractive or Repulsive forces b/w molecules
→ Volume occupied by gas is negligable

FORMULAS

$PV = \frac{1}{3} mN\bar{c}^2$

$\bar{c}^2 = \frac{n_1c_1^2 + n_2c_2^2 + \cdots}{n_1 + n_2 + \cdots}$

$K = °C + 273$

$C° = Kelvin - 273$

$KE = \frac{1}{2} m\bar{c}^2$

$PV = nRT$

$P = k\frac{1}{V}$

$P_1V_1 = P_2V_2$

$V_t = \frac{V_0}{273} T$

$V = kT$

PRESSURE

1 atm = 101325 Pa = 101325 Nm^{-2}
1 atm = 14.7 Psi
1 atm = 101.325 kPa
1 atm = 760 torr = 760 mmHg
1 Joule = 1 Nm = 10^7 ergs = kg^2s^{-2}
1 Calorie = 4.18 J
1 atm = 1.01325 bar

INTRODUCTION

- 3 States of Matter
  ↳ gas, liquid, Solid
- gas → "Chaos" → Random motion
- Brown → movement, they collide
- gas → no shape (specific)
- Intimate mixing → diffusion b/w liquid & gas

More FORMULAS

→ $C_{RMS} = \sqrt{\frac{3RT}{M}}$

→ $\frac{\gamma_1}{\gamma_2} = \sqrt{\frac{d_2}{d_1}} = \sqrt{\frac{M_1}{M_2}}$

→ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

→ $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

→ $M = \frac{WRT}{PV}$

→ $d = \frac{MP}{RT}$

VAN DER WAAL'S

Volume Correction:-
$V = V_{vessel} - nb$
Pressure Correction:-
$P_i = P + \frac{an^2}{V^2}$

BASIC RELATIONS

→ Kinetic Energy ∝ Temperature
→ Pressure ∝ $\frac{1}{\text{Volume}}$ [Boyle's law]
→ Volume ∝ Temperature [Charles law]
→ Volume ∝ No of Holes [Avagdro's law]
→ Volume ∝ $\frac{1}{\text{Mass}}$ [Granam's law]

$\gamma \propto \frac{1}{\sqrt{d}}$ or $\gamma \propto \frac{1}{\sqrt{M}}$

Rate of diffusion or effusion ∝ $\frac{1}{\text{Square root of density}}$

DEVIATION

Gas deviates from ideal gas at low temperature & High pressure

DALTON'S LAW

Total pressure is equal to some of partial pressure of Each gas

Joule's thomson's

Highly compressed gas allowed to escape through throttle, decreases temp & converts to liquid

PLASMA

- 4th state
- Molecular gas → Atomic gas → Ions
- Neutral particles
- 10000K – 100000K
- glow
- William Crookes

MOTION

TRANSLATIONAL MOTION
- place to place & in all directions movement
- Kinetic translational Energy

ROTATIONAL MOTION
- Net angular momentum
- Kinetic rotational Energy

VIBRATIONAL MOTION
- Back & forth or Oscillatory motion
- Total E = K.E + P.E

VALUE OF R

R = 0.0821 dm^3 atm mol^{-1} K^{-1}
R = 62400 cm^3 torr mol^{-1} K^{-1}
R = 8.3143 Joule mol^{-1} K^{-1}