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2020

ETHIOPIA

CHEMISTRY GRADE 9

UNIT-5

SUMMARY

PHYSICAL STATES OF MATTER

BY:ADDIS ABABA EDUCATION BUREAU

MAY 2020

Main Contents

start

5.1-Introduction

start

- All object around us is called matter.
- Matter can exist in three physical state.

- The physical state of a given sample of matter depend on temperature & pressure

Eg; water

5.2 Kinetic theory and properties of matter

5.2.1 The kinetic Theory of matter

- **Generally, the kinetic theory of matter is based on the following three assumptions;**

1. All matter is composed of particles which are in constant motion.

2. The particles possess kinetic energy and potential energy.

3. The difference b/n the three states of matter is due to their energy contents and the motion of the particle.

It explain;

-The three state of matter in which substances are chemically the same but physically different and the nature of the motion and the heat energy.

Eg; Water

(CONT'D....)

- **It explain;**

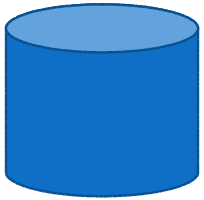
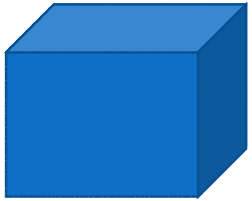
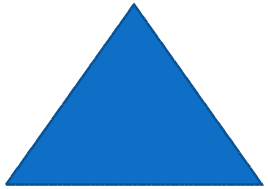
  -The three state of matter in which substances are chemically the same but physically different and the nature of the motion and the heat energy.

  E.g; Water

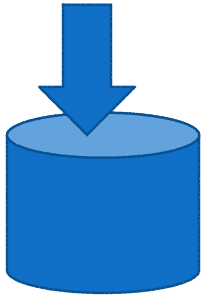
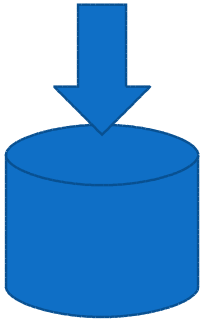
5.2.2 Properties of Matter

1.Properties of Gases

- Gases have no definite shape and definite volume.

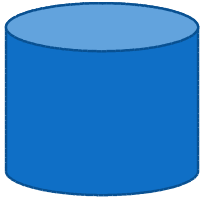




- Gases can be easily compressed.

(CONT'D....)

- Gases exert pressure in all directions.



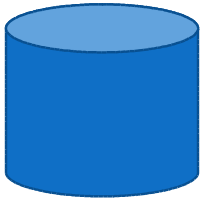
- Gases have low densities compare with liquids and solids.

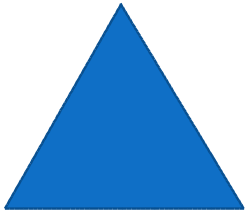
- Gases easily flow and diffuse through one another.

(CONT'D....)

2. Properties of Liquids

- Liquids have a definite volume, but have no definite shape.





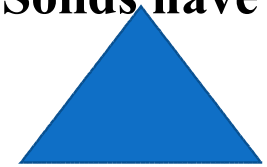
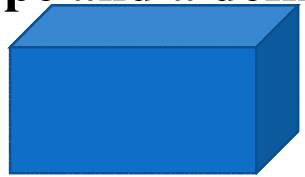
- Liquids have higher density than gases.

- Liquids are slightly compressible
- Liquids are fluids

(CONT'D……)

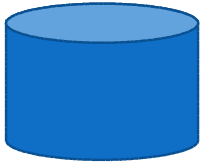
3. Properties of Solids

- **Solids have a definite shape and a definite volume**


Solids generally have higher densities than gases and liquids

- **Solids are extremely difficult to compress.**

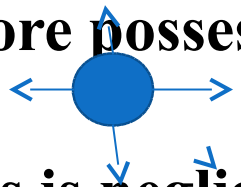
- **Solids are not fluids.**

5.3 THE GASEOUS STATE

5.3.1 The Kinetic Molecular Theory of Gases

Assumptions of the kinetic molecular theory of gases

1. The particles are in a state of constant , continuous and random motion therefore possess Kinetic energy.

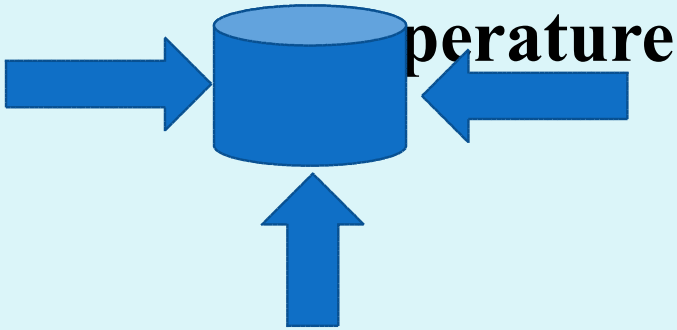


2. The volume of the particles is negligible compared to the total volume of the gas.

3. The attractive forces b/n the particles are negligible.

when they collide, they do not stick together but immediately bounce

4. The average KE of gas particles depends on the temperature of the gas.



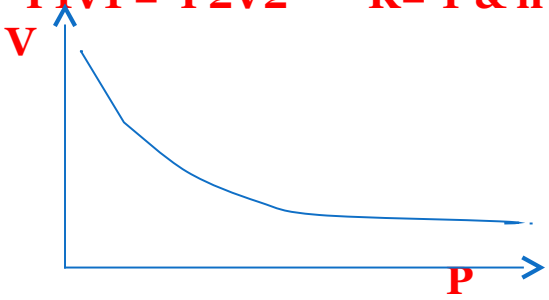
5.3.2- THE GAS LAWS

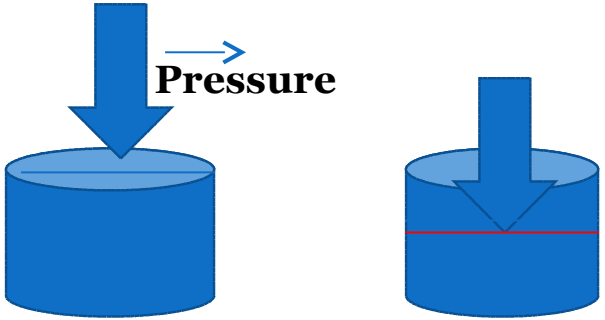
- **Gas laws express mathematical relationships b/n the pressure , temperature , volume and quantity of a gas.**

(CONT'D....)

1. BOYLE'S LAW

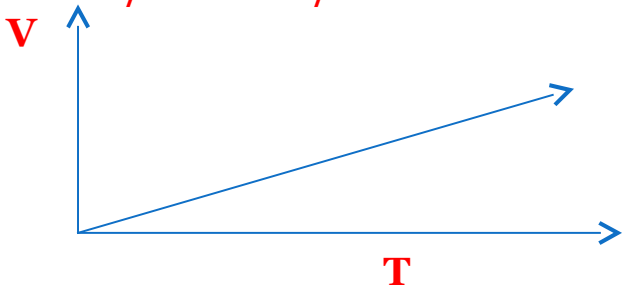
$P_1V_1 = P_2V_2$ K= T & n

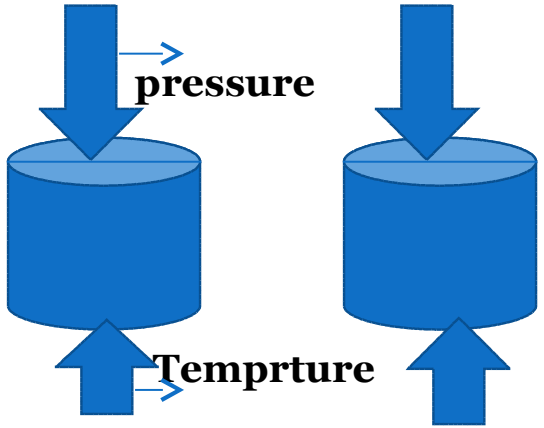




2. CHARLE'S LAW

$V_1/T_1 = V_2/T_2$ K= P & n





(CONT'D....)

Eg ;. **A gas has a volume of 50L @STP. Assuming no temperature change , what volume will the gas occupy , if the pressure is doubled?**

(CONT'D....)

Eg;. **A sample of gas is heated from $27^{o}c$ to $627^{o}c$. By what factor does the volume increase if the pressure remains constant?**

(CONT'D....)

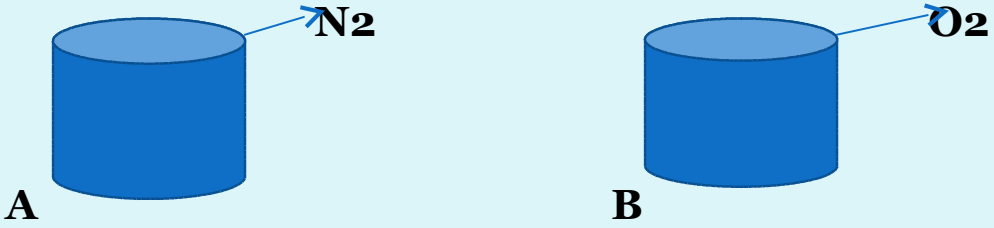
3. Combined Gas Law

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \qquad n=k$$

4. Avogadro's law

V of A & B equ.

T & P the same



5. Ideal Gas Law

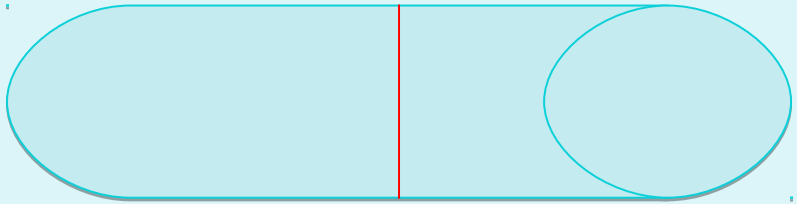
PV= n RT

5. Graham's Law of Diffusion

Graham's Law State that "at constant temperature and pressure , the rate of diffusion of a gas, r, is inversely proportional to the square root of its density ,d , or molar mass ,M ."

$$\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}} = \sqrt{\frac{d_2}{d_1}}$$

(CNNT'D

- Eg;-
- NH_3  CO_2

(CONT'D)

Eg;. A 35g of CO_2 in a 1Lvessel @ 240c exerts a pressure of 19.4atm. How many CO_2 molecules does the sample contain?

(CONT'D)

Eg; If a gas occupies 44.8L at STP and has a mass of 34g,then the gas could be

A. NH_3 B. CO_2 C. H_2O D. H_2S

(CONT'D)

Eg; The density of a gas at a pressure of 1.34atm and a temperature of 303K is found to be 1.77g/L. What is the molar mass of this gas?

(CONT'D)

Eg;. Calculate the relative rates of diffusion of hydrogen (H_2) and oxygen(O_2)