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Lect:-19

Part:-I

GASEOUS STATE (Sub)

1. INTRODUCTION

A given substance may occur in solid, liquid or gaseous phase depending upon the relative value of two tendencies namely mutual Attraction (MA) and Escaping Tendency (ET)

(i) if MA is greater than ET then substance will occur in solid state

(ii) if MA is slightly greater than ET then substance will occur liquid state.

(iii) if MA is very much less than ET then substance will occur in gaseous state out of the three states of matter, we will study the gaseous state.

This state of matter is characterized by sensitivity of volume change with change of of pressure and temperature. It is due to large distance between molecules as compared to their own dimensions.

Gaseous state can be defined as collection of molecule far apart continuously in motion.

2. MEASURABLE PROPERTIES OF GASES

2.1 Mass: The mass of gas is generally used in the form of number of moles which is related as

(i) no. of moles $= \frac{\text{wt. in gm}}{\text{molecular mass of gases}}$ $\left(n = \frac{W}{M}\right)$

Two other useful formulae to calculate number of moles of gas are—

(ii) number of moles $= \frac{\text{no. of molecules of given gas}}{\text{Avogadro's number of molecules}}$ $\left(n = \frac{N}{N_A}\right)$

(iii) no. of moles $= \frac{\text{Volume of given gas in litres at STP}}{22.4\,L}$

2.2 Volume: Volume of gas is volume of the ~~coldness~~ container in which it is present, i.e. space which the gas molecules can occupy.

Relation between different units of volume

$1m^3 = 10^3\ dm^3 = 10^3$ litre $= 10^6\ cm^3 = 10^6\ ml = 10^9\ mm^3$

2.3 Temperature: Degree of hotness or coldness of a body is measured by temperature

$$\frac{C}{100} = \frac{K - 273}{100} = \frac{F - 32}{180}$$

C – Celcius scale, K – kelvin scale, F – Fahrenheit scale

<u>Note</u>: In all the problems of gaseous state (i.e. in all gas law equations), temperature must be expressed in kelvin scale. i.e.,

$$t^\circ C + 273.15 = T K$$

2.4 Pressure: Pressure of gas is defined as the force exerted by the gas on the walls of its container. It is often assumed that pressure is isotropic, i.e. it is the same in all the three directions.