UG SEM II (MJC - 2T), Physical chemistry

1. Gaseous state

Gas Laws:

The three fundamental gas laws discover the relationship of pressure, temperature, volume and amount of gas. Boyle's law tells us that the volume of gas increases as the pressure decreases. Charles' law tells us that the volume of gas increases as the temperature increases and Avogadro's law tells us that the volume of gas increases as the amount of gas increases. The ideal gas law is the combination of the three simple gas laws.

Ideal gases:

Ideal gas, or perfect gas, is the theoretical substance that helps establish the relationship of four gas variables, pressure (P), volume (V), the amount of gas (n) and temperature (T). It has characters described as follows:

(i) The particles in the gas are extremely small, so the gas does not occupy any spaces.

(ii) The ideal gas has constant, random and straight-line motion.

(iii) No forces between the particles of the gas. Particles only collide elastically with each other and with the walls of Container.

Real Gases:

Real gas, in Contrast, has real volume and the Collision of the particles is not elastic, because there are attractive forces between particls. As a result, the volume of real gas is much larger than of the ideal gas, and the pressure of real gas is lower than of ideal gas. All real gases tend to perform ideal gas behavior at low pressure and relatively high temperature.

The Compressibility factor (z) tells us how much the real gases differ from ideal gas behavior.

$$Z = \frac{PV}{nRT}$$

For ideal gases, $z = 1$.

For real gases, $z \neq 1$.

P = Pressure,
V = volume,
n = no. of moles
R = Gas Constant, T = temperature.