

IDEAL GAS EQUATION

You have learnt different gas laws; Avogadro law, Boyle's and Charles law. If we combine all these laws we get a new equation which is known as Ideal Gas Equation. You may think; why do we call it Ideal gas equation? I hope you will be able to get your answer by the end of this post.

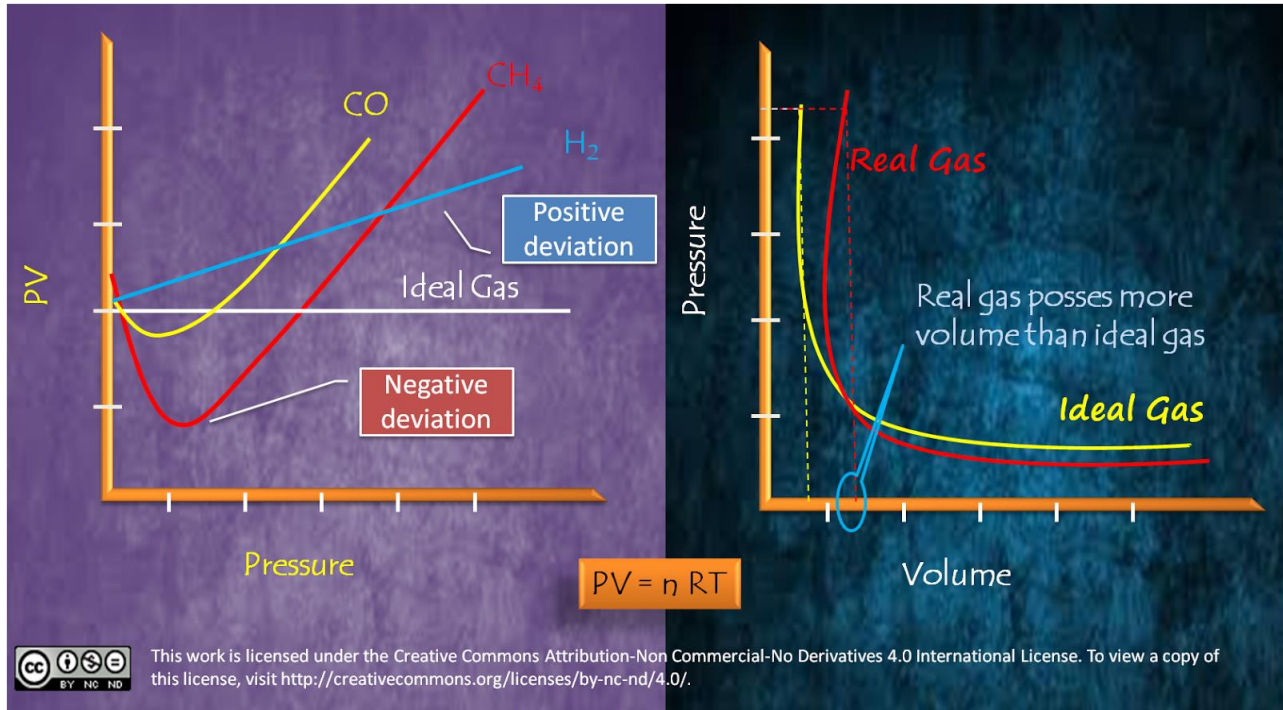
Let's discuss the Ideal Gas Equation. When we combine all the three laws we get a new equation in which P and V are proportional to the n and T . Here R is the proportionality constant and it is same for all gases. Its value depends upon the units used for the measurement of p , V and T .

In Ideal Gas Equation, product of P and V is constant for a fixed number of moles under constant Temperature. That means if we plot a graph between PV and P we would get a straight line parallel to the x axis.

On the basis of these laws, Scientists developed a theory about gas molecules known as Kinetic molecular theory of gases. A list of a few qualities of Ideal gas molecules according to this theory is as follows:

- It is assumed that ideal gas molecules are so small that they occupy a negligible space, that's why they can be compressed into very little space.
- There is no force of attraction between these molecules that's why they can spread in all the available space.
- These molecules are always in motion and their collisions are perfectly elastic.

- When these molecules collide with the wall of the container they exert pressure on it. On increasing temperature kinetic energy of molecules also increases, that's why pressure increases on increasing temperature.



Calculations based on Kinetic molecular theory of gases fits well with experimental data, but when scientists tried to test how far $PV = nRT$ reproduces pressure- volume-temperature relationship of gases, they found different graphs for different gases which were not similar to the graph of Ideal Gas Equation. There is considerable deviation from the Ideal Gas Equation. Few gases show negative deviation while some shows positive deviation from the ideal behaviour. But no gas follows Ideal behaviour as described in Ideal gas equation. That's why these gases are called real gases.

Why real gases don't obey Avogadro law, Boyle's and Charles law under all conditions? To understand the reason behind it we have to look again into the model of

ideal gas which is proposed by Kinetic molecular theory of gases. In the next post we will try to find out where Kinetic molecule theory of gas went wrong and how we can correct it.

Source : <http://chemistrynotmystery.blogspot.in/2014/11/ideal-gas-equation.html>