Maxwell Boltzman law of distribution of Molecular Velocities:

Maxwell and Boltzman using probability consideration. They have shown that the distribution of molecular velocities depends on the temperature and molecular weight of a gas and is given by the expression,

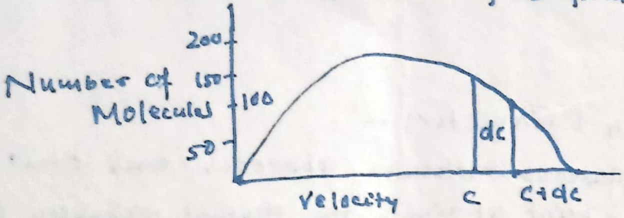
$$\frac{dn_c}{n} = 4\pi\left(\frac{M}{2\pi RT}\right)^{3/2} e^{-\frac{Mc^2}{2RT}} c^2 dc$$

Where dn_c is the number of molecules out of the total number of n molecules which have velocities between c and $c+dc$, T is is Temperature and M is the molecular wt of the gas. The ratio $\frac{dn_c}{n}$ gives therefore the fraction of the total number of molecules having velocities between c and $c+dc$

Dividing both side the above eq^n by dc, we get.

$$\frac{1}{n}\cdot\frac{dn_c}{dc} = 4\pi\left(\frac{M}{2\pi RT}\right)^{3/2} e^{-\frac{Mc^2}{2RT}} c^2$$

The L.H.S. expression gives the probability of finding the molecules with the velocity c. If now the fraction of the total number of molecules for any gas of known molecular wt. at any particular temperature is plotted against the velocities, a distribution curve of the form shown in figure is obtained



The curve shows that the fraction of molecules having velocities between c to c+dc is given by the area under the strip of the curve within the velocity range. The area between two coordinates seperated by dc is clearly equal to $\frac{dn_c}{n}$, hence the area under the whole curve is equal to the total number of molecules and the hight of ordinate corresponds to any velocity is virtually a measure of the fraction of the molecules which have the velocity.

The shape of the curve says that the fraction of molecules having too low or too high velocities is very small and the majority of the gas molecules have some intermediate velocity with a small range of variation more or less around the peak, known as the most probable velocity.