* Occupation number—

The no. of system in a particular state is called occupation no.

— The set of occupation no. is called distribution.

* Micro state and Macrostate—

A microstate of a system may be defined as that state to which cells in which each molecule of the system belongs temporarily.

In other words—

A microstate of the system may be defined by the specification of six co-ordinates x, y, z, p_x, p_y & p_z of each molecule of the system within the limits of the dimensions of the cell in which its representative point lies. It mean that in order to define a microstate we must specify the place of each molecule within the limits dx, dy, dz and the magnitude and direction of each molecule with the limits dp_x, dp_y and dp_z.

ON the other hand—

A macro state of a system may be defined by the specification of the number of molecule -s or phase points in each cell of phase space, such as n_1 molecule in cell 1, n_2 molecule in cell 2, n_3 molecule in cell 3 and so on...

on understanding the distinction between the distribution of 100 distinguishable balls in to five box in such a way that each box having 20 balls. The overall distribution is called a macrostate.

On the other side the discription of distribution of that balls numbered 1 to 20 can be appear in box – 1, 21 to 40 in box – 2, 41 to 60 in box – 3 and so on is called microstate.

* No. of degeneracy –
* Statistical weight factor –

No. of degeneracy of each energy state is called statistical weight factor.

It is denoted by 'g'.

The energy of particle in a three dimensional box is given by –

$$E = \frac{h^2}{8ma^2}\left(n_x^2 + n_y^2 + n_z^2\right) \quad \text{—} (1)$$

→ if $n_x = 1$, $n_y = 1$ & $n_z = 1$

then eqⁿ – (1) becomes.

$$E_{111} = \frac{h^2}{8ma^2}\left(1^2 + 1^2 + 1^2\right)$$

$$E_{111} = \frac{3h^2}{8ma^2}$$

This energy state is called non-degenerate.

→ if $n_x = 2$, $n_y = 1$ & $n_z = 1$

then three possibility occurs –

$n_x = 2$, $n_y = 1$, $n_z = 1$.

$n_x = 1$, $n_y = 2$, $n_z = 1$

$n_x = 1$, $n_y = 1$, $n_z = 2$.

then eqⁿ – (1) becomes –

$$E_{211} = \frac{h^2}{8ma^2}\left(2^2 + 1^2 + 1^2\right)$$

or, $E_{211} = \frac{6h^2}{8ma^2}$

similarly,

$E_{121} = \frac{6h^2}{8ma^2}$

& $E_{112} = \frac{6h^2}{8ma^2}$

These energy states are called degenerate-state.

It is noted that in first energy state there is only one set of quantum no (111) that gives the energy state and this level is said to be non-degenerate.

In second energy state there are three sets of quantum no. viz. (2,1,1), (121) & (112) of quantum nos the, or & nz that will gives the same energy level $6h^2/8ma^2 = 3h^2/4ma^2$. such level is said to be degenerate. states.

Thus -

no. of degeneracy in second energy state is -

$g = 3.$