

Degrees of freedom of a gaseous molecule.

(1) The motion of atoms and molecules is generally described in terms of the degree of freedom which they possess.

(2) The degrees of freedom of a molecule are defined as the independent number of parameters required to describe the state of the molecule completely.

(3) When a gaseous molecule is heated, the energy supplied to it may bring about three kinds of motion in it, these are,

(i) The translational motion

(ii) The rotational motion

(iii) The vibrational motion.

This is expressed by saying that the molecule possesses translational, rotational and vibrational degrees of freedom.

(3) For a molecule made up of N atoms, total degrees of freedom = $3N$. Further split up of these is as follows :

| | Translational | Rotational | Vibrational |
|--------------------------|---------------|------------|-------------|
| For linear molecule: | 3 | 2 | $3N - 5$ |
| For non-linear molecule: | 3 | 3 | $3N - 6$ |