* Application of Distribution law :-

(1) Study of Complexes :-

Study of $KI + I_2 \rightleftharpoons KI_3$ Solution.

This is very important application of distribution law. This complex reaction is studied as follows - Some I_2 is added to a known eq. solution of KI and a reaction mixture is shaken with CCl_4. The I_2 in the two layers is accurately titrated by means of sodium-thiosulphate solution. The concentration of I_2 in two solvent is known. The total I_2 present after the reaction is substracted from the amount of I_2 taken. The difference gives the I_2 combined with KI to form KI_3. Similarly, the amounts of KI, I_2 & KI_3 in a given volume of solution can be obtained and the concentrations are calculated as follows :-

Calculation :-

Let, c_1 = Concentration of I_2 in CCl_4 layer.

c_2 = concentration of free I_2 in KI solution (calculated from $c_2 = c_1/K$) = $[I_2]$

Again, let c_3 = Concentration of I_2 in KI solution

then, $c_3 - c_2$ = Concentration of Combined I_2 = $[I_3^-]$

If c_4 is the concentration of KI solution. so, that

$c_4 - (c_3 - c_2)$ = Concentration of KI in solution

= $[I^-]$

At equilibrium —

$$I_2 + I^- \rightleftharpoons I_3^-$$

$$K = \frac{[I_3^-]}{[I_2][I^-]}$$

$$K = \frac{c_3 - c_2}{c_2 \times [c_4 - (c_3 - c_2)]}$$

(2.) Determination of molecular state of solute in different solvent :-

He can determine the molecular state of solute in different solvent. If solvent molecules dissociates, associates and combine with solvent molecules. They may be determine by following relations —

	Solvent - I	Solvent - II	Relationship
(1)	Normal	(1) Normal	$K = c_1/c_2$
(2)	Normal	(2) Dissociation	$K = \frac{c_1}{c_2(1-\alpha)}$
(3)	Normal	(3) Association	$K = \frac{c_1}{\sqrt[n]{c_2}}$
(4)	Normal	(4) chemical combination with solvent	$\frac{K}{1+K_2} = \frac{c_1}{c_c + c_2}$