Colligative properties of solution of electrolyte Some solutes which associate or dissociate in the solvent and yield abnormal results. In order to account for all abnormal cases, vant Hoff fretor (i) is used. Now, i= No. of moles after dissociation/aspeiation No. of moles initially present Exp(Colligative proposty) Theoretical (colligative proporty) o For association of solute; Consider the association of a solute A into its associated form (A), according to the sention $nA = (A)_n$ where n is the number of molecules of solute, which combine to form an associated species. $nA = (A)_n$ At initially C. At equilibrium moles: C-ca

:. Total modes at equilibrium = $C-C \propto + \frac{C \propto}{n}$ = $C(1-\alpha + \frac{\alpha}{n})$

Now,
$$i = \frac{No. \text{ of moles after association}}{No. \text{ of moles for no association}}$$
or, $i = \frac{C(1-x+\frac{x}{n})}{C}$

$$\alpha_{i} = 1 - \alpha + \frac{\alpha}{h} = 1 - \alpha \left(1 - \frac{1}{n}\right)$$

or,
$$l-1=-\ll(1-\frac{1}{n})$$

$$\alpha$$
, $\alpha = \frac{\mathring{l}-1}{-(1-\frac{1}{h})}$

9f association is complete, i.e., x=1.50 from equation. D, we get

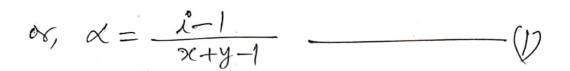
That is the experimental value of a colligative property is in-times the theoretical value.

gf mo association occurs, è.e., x=0.50 from equation O, we get

$$\dot{e} = 1$$
 - 3

That is, the experimental and theoretical value of colligative propostys will be equal.

o For dissociation of solute: Consider on electrolyte, AxBy which partialy dissociates in solution yielding x ions of Att and y ions of Be and if a is the degree of dissociation and c is the initial concertation of the solute, then we can write AxBy => 20 A &+ yB2-Initial concentration: C x.cx j.cx Concentrationat equilibrium: C-CX : Total moles at equilibrium = c-cx+cxx+cyx = C[1-0+20x+y0] = C(1-x(1-2e y = C[1+ xx+yx-~] = e[1+ x(x+y-)] Hence, l = No. of moles after dissociation
No. of moles for no dissociation or, i = <u>c(1+ x(3+4-1)]</u> ds, $\dot{e} = 1 + \alpha(x+y-1)$ $\delta \epsilon$, $\ell-1=\alpha(24+y-1)$



If the dissociation is complete, i.e., x=1.50 from equation O, we get

$$\ell-1=x+y-1$$

That is, the experimental colligative property is (244)-times the theoretical value.

9f no dissociation occurs, i.e., x=0.50 from equation D, we get

i=1 3

That is, the experimental and theoretical value of collegative posperty will be equal.