Day-27

→ Ionic defects → defect chemistry
↓
Notation

→ Internal → Bulk of the material
+
Higher dimensional defects

→ Cation : anion ratio remains same in stoichiometric defect
↓
No higher dimensional (or 1D)
(• Frenkel → cation sub-lattice
• Anion Frenkel → Silver Halide)
higher-D defect is involved
↓
Schottky defect (NaCl)

→ Building block notation of ionic defects (point) : Nil ⟷ $Ag^{\cdot} + (Ag)'$

→ Kröger-Vink Notation :

Any defect - M_S^C
- C → Relative charge
- M → Structural element
- S → Interstitial (I) or regular Position

☆ For AgCl :

V'_{Ag} → Silver site
Charge on that site → +1 (0 − (+1))

V'_{Ag} → A singly ionized vacancy on a silver site.

↓

-vely charged ionic defined.

$V^{\cdot}_{Cl}$ → singly ionized chlorine vacancy

$Ag^{x}_{Ag} + V^{x}_{i} \rightleftharpoons Ag_i + V'_{Ag}$

x → no charge associated

$Nil \rightleftharpoons [V'_{Ag} - Ag^{x}_{Ag}] + [Ag^{\cdot}_{i} - V^{x}_{i}]$

→ mass Action Law:

$[V'_{Ag}]$ → concentration of singly ionized silver vacancies

Electroneutrality condition (ENC)

↓

$[V'_{Ag}] = [Ag^{\cdot}_{i}]$

$$K_F = \frac{[V'_{Ag}][Ag^{\cdot}_{i}]}{[Ag^{x}_{Ag}][V^{x}_{i}]} = e^{\frac{-\Delta G^{\circ}_F}{RT}}$$

$[Ag^{x}_{Ag}] \rightarrow N$, $[V^{x}_{i}] \rightarrow \alpha N$

$$= e^{\frac{-\Delta H^{\circ}_F}{RT}} \cdot e^{\frac{\Delta S^{\circ}_F}{R}}$$

140 kJ/mol, 9.4R

Plot is at particular activity of Ag and partial pressure of Cl.