Chapter 9:- solid solutions & phase Equilibrium

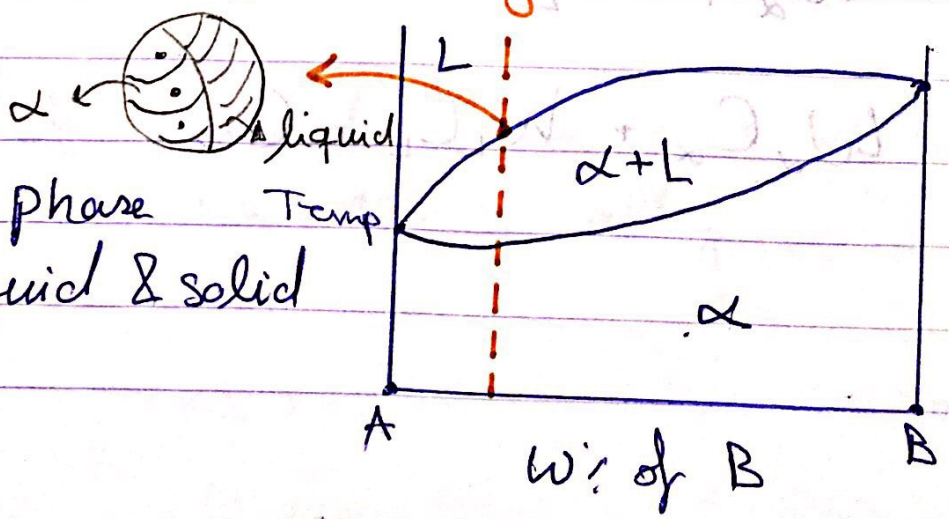
Gibbs phase rule:

$$N + C = F + P$$

- N: Number of noncompositional Variables
- F: degree of Freedom
- C: Number of components (elements, or compounds)
- P: Number of phases

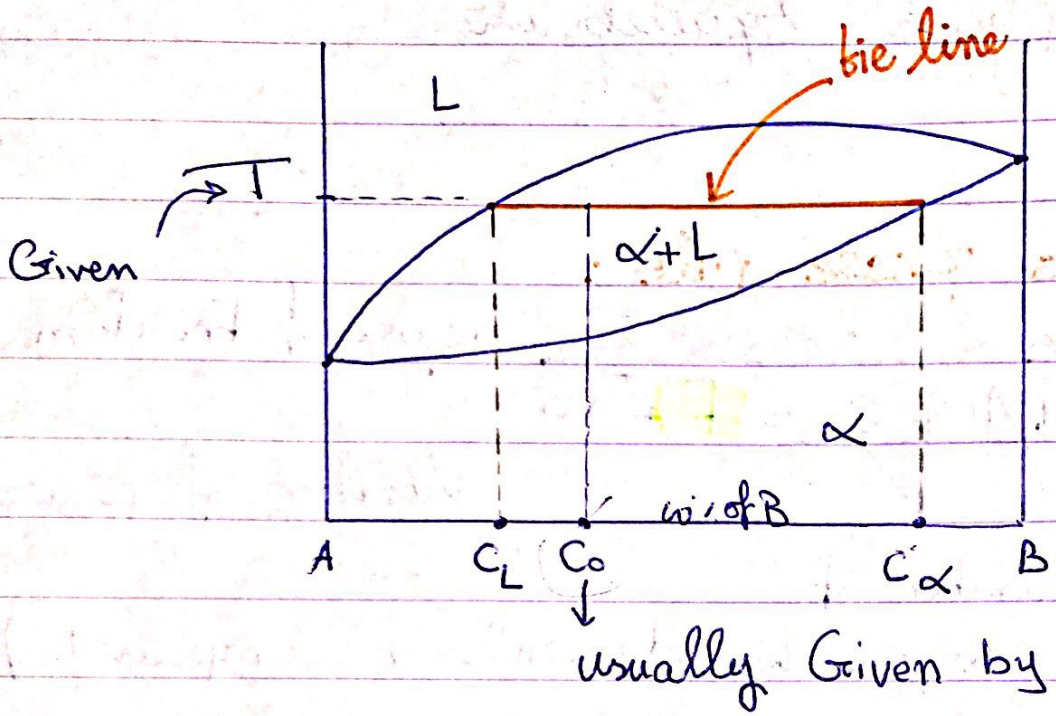
- Equilibrium occurs when system doesn't Changes with Time

Binary isomorphous System:



L: liquid phase
α+L: liquid & solid
α: solid

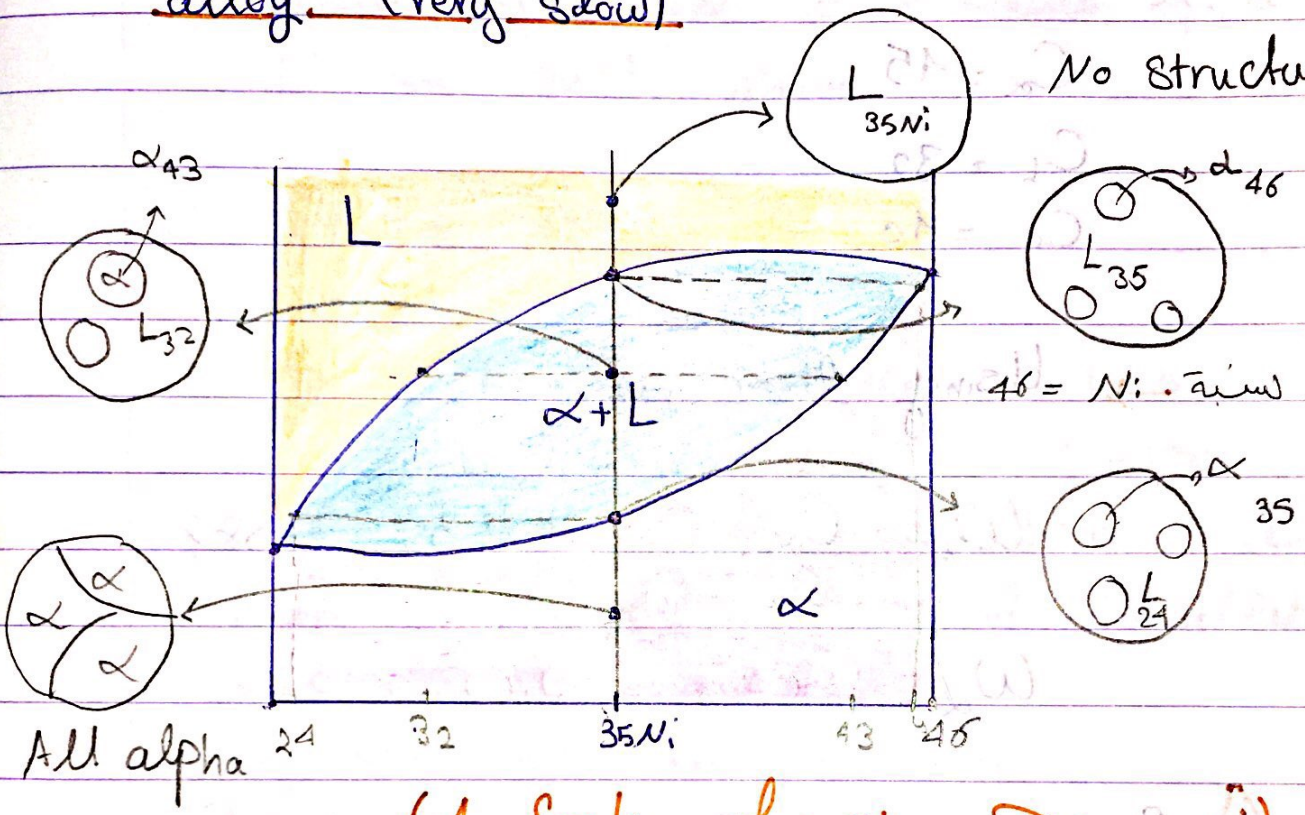
lever Rule:-



usually Given by the Question

- W_L (weight of liquid) $= \frac{S}{R+S} = \frac{C_\alpha - C_o}{C_\alpha - C_L}$
- $W_\alpha = 1 - W_L = \frac{R}{R+S} = \frac{C_o - C_L}{C_\alpha - C_L}$
- $W_\alpha + W_L = 1$
- $W_\alpha C_\alpha + W_L C_L = C_o$

Very slow cooling of an isomorphous alloy (very slow)



α35Ni
L = 0

(A Section of a phase Diagram)

Graph 2

→ Solving Exercises using lever rule

Ex 9.9 page 37 + 38 in slides

Calculate amount of α and L at 1250° in Cu- 40% Ni alloy.

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→ Using the Graph

$C_\alpha = 45$

$C_L = 32$

$C_0 = 10$

→ Using lever rule:

$$W_L = \frac{C_\alpha - C_0}{C_\alpha - C_L} = 0.38 = 38\%$$

$$W_\alpha = 1 - 0.38 = 0.62 = 62\%$$

⚠ Remember: C_α = تركيز α في Ni

C_L = تركيز L في Ni

When the Question asks for the amount of phase ≡ amount of α
L in each phase

Back to graph 2

In pink Region, α = 100; L = 0
In orange Region: α = 0 L = 100.
In Blue Region, You use lever rule
Given (a specific T and Concentration

→ Seen, page 40 in the slides
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