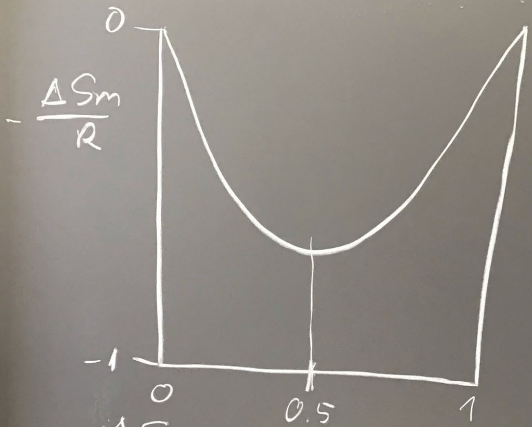
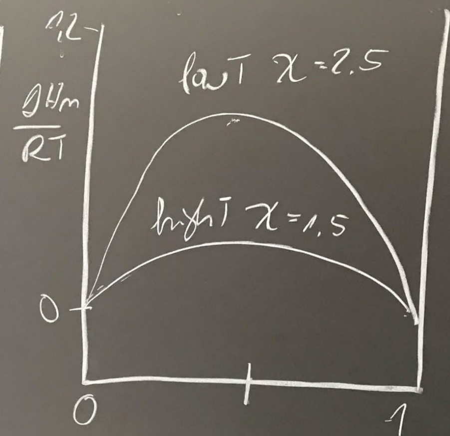




$$\Delta G_m < 0$$

$$\left(\frac{\partial^2 \Delta G_m}{\partial x^2}\right)_{p,T} > 0$$

$$-\frac{\Delta S_m}{R} = x_1 \ln x_1 + x_2 \ln x_2$$

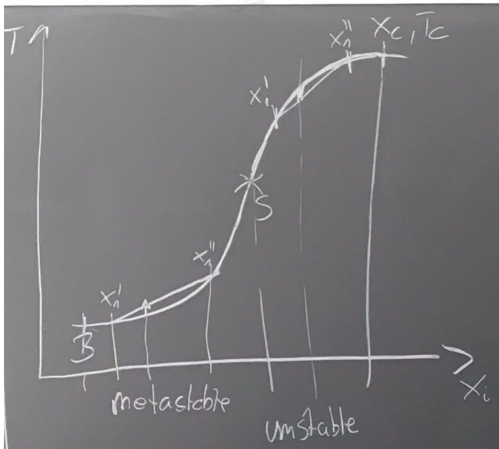
per mole of lattice site

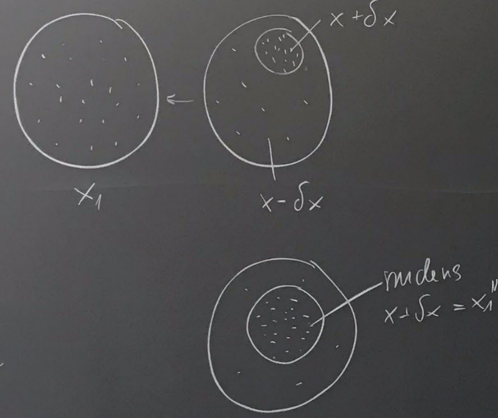
$$\frac{\Delta H_m}{RT} = x_1 x_2 \chi$$

$$\chi \equiv \frac{\Delta z w}{kT}$$

$$\chi \sim \frac{1}{T}$$

$$\frac{\Delta G_m}{RT} = \left(x_1 \ln x_1 + x_2 \ln x_2 + x_1 x_2 \chi\right)$$

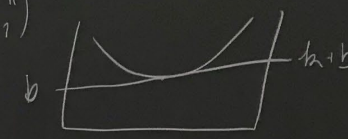




Binodal $\mu_1(x_1') = \mu_1(x_1'')$

$\mu_2(x_1') = \mu_2(x_1'')$

$\mu_1 \neq \mu_2$



$y = kx_1 + b$

Critical $\frac{\partial^3 \Delta G_m}{x^3} = 0$

Spinodal $\frac{\partial^2 \Delta G_m}{x^2} = 0$

$$\frac{\partial^3 \Delta G_m}{x^3} = \frac{1}{N x_2^2} \mp \frac{1}{(1-x_2)^2} = 0 \qquad x_c = \frac{1}{1+\sqrt{N}}$$

$x_1 + x_2 = 1$

$$\frac{\partial^2 \Delta G_m}{\cancel{x}^2} = \frac{1}{1-x_2} + \frac{1}{N x_2} - 2\chi \longrightarrow \chi = \frac{1}{2}\left(N x_2 + \frac{1}{1-x_2}\right)$$

$$\chi_c = \frac{1}{2}\left(\underset{\downarrow 0}{\frac{1}{N}} + \underset{\downarrow 0}{\frac{2}{\sqrt{N}}} + 1\right)$$

$N = 1 \quad \chi_c = 2$

$N \to \infty \quad \chi_c = \frac{1}{2}$

per site

$$\frac{\partial^2}{\partial \nu^2}\left(\frac{\Delta G}{kT}\right) = \frac{1}{\nu_A N_A} + \frac{1}{\underbrace{(1-\nu_A)}_{\nu_B} N_B} - 2\chi = 0$$

$$\frac{\partial^3}{\partial \nu^3}\left(\frac{\Delta G}{kT}\right) = -\frac{1}{\nu_A^2 N_A} + \frac{1}{(1-\nu_A)^2 N_B} = 0$$

Critical comp $\nu_{A,c} = -\frac{N_B \pm \sqrt{N_A N_B}}{N_A - N_B}$

$$\nu_{A\,crit} = \frac{\sqrt{N_B}}{\sqrt{N_A} + \sqrt{N_B}}$$

$$\chi_{crit} = \frac{(\sqrt{N_A} + \sqrt{N_B})^2}{2 N_A N_B}$$

Flory-Huggins $N_B = 1$ (solvent)

N_A polymer $N \to \infty$

$\nu_{crit} = \frac{1}{1+\sqrt{N_A}}$

$\chi_{crit} = \frac{1}{2}$

blend symmetric $N_A = N_B = N$

$N \to \infty$

$\nu_{A\,crit} = \frac{1}{2}$

$\chi_{crit} = 0$