Exercises on Ch.22 *Physical solution models*

22.5 Long-range order

Exercise 22.5.1

Derive an expression for the curved line like he one in Fig. 21.3(b), but for the equilibrium distribution in an ordered 50/50 alloy.

Hint

Use Eqs. 21.48 and 21.50.

Solution

$$y'_A + y''_A = 2x_A = 1; \quad y''_A = 1 - y'_A; \quad y'_A + y'_B = 1; \quad y'_B = 1 - y'_A; \quad y''_B = 1 - y''_A = y'_A;$$

$$2x_A x_B T / T_{tr} = (4y'_A - 2)/\ln[(y'_A)^2/(1-y'_A)^2] = (2y'_A - 1)/\ln[y'_A/(1-y'_A)].$$

$$T/T_{tr} = (2y'_A - 1)/\ln[y'_A/(1-y'_A)]/2x_A x_B = 2(2y'_A - 1)/\ln[y'_A/(1-y'_A)]$$