

Name: _____

Homework for Lecture 16-18

Consider the precipitation of a spherical B-rich phase (β phase) from a dilute solution (α phase) of B in A. Suppose the original concentration of B in the solid solution is $C_0=5 \times 10^{21}$ atoms/cm³, the diffusion coefficient of B is $D=10^{-10}$ cm²/sec, and the interface transfer parameter of B is $M=10^{-6}$ cm/sec. In a quasi-steady state, if the averaged concentration of B in the bulk (C_t) remains approximately the same as C_0 , and the concentration of B next to the α/β interface is $C_r=4 \times 10^{21}$ atoms/cm³, what are the equilibrium concentration of B in the α and the β phases (C_α and C_β), when the radius of the β particle is $r = 1 \text{ } \mu\text{m} = 10^{-4}$ cm and grows at a rate $\left(\frac{dr}{dt}\right)$ of 10^{-7} cm/sec?