Interpretation of Phase Diagrams

9.6 *Cite the phases that are present and the phase compositions for the following alloys:*

(a) 15 wt% Sn–85 wt% Pb at 100°C

(b) 25 wt% Pb–75 wt% Mg at 425°C

(c) 55 wt% Zn–45 wt% Cu at 600°C

9.8 *A 50 wt% Ni–50 wt% Cu alloy is slowly cooled from 1400°C to 1200°C.*

(a) At what temperature does the first solid phase form?

(b) What is the composition of this solid phase?

(c) At what temperature does the liquid solidify?

(d) What is the composition of this last remaining liquid phase?

9.9 *Determine the relative amounts (in terms of mass fractions) of the phases for the alloys and temperatures given in Problem 9.6.*

9.12 *A 40 wt% Pb–60 wt% Mg alloy is heated to a temperature within the α + liquid-phase region. If the mass fraction of each phase is 0.5, then estimate:*

(a) the temperature of the alloy

(b) the compositions of the two phases in weight percent

(c) the compositions of the two phases in atom percent

Binary Eutectic Systems

9.18 *A 60 wt% Pb–40 wt% Mg alloy is rapidly quenched to room temperature from an elevated temperature in such a way that the high-temperature microstructure is preserved. This microstructure is found to consist of the α phase and Mg_2Pb, having respective mass fractions of 0.42 and 0.58. Determine the approximate temperature from which the alloy was quenched.*

9.24 *For a 76 wt% Pb–24 wt% Mg alloy, make schematic sketches of the microstructure that would be observed for conditions of very slow cooling at the following temperatures: 575°C, 500°C, 450°C, and 300°C. Label all phases and indicate their approximate compositions.*