10.34 In this problem we are asked to describe the simplest heat treatment that would be required to convert a eutectoid steel from one microstructure to another. Figure 10.27 is used to solve the several parts of this problem.

(a) For martensite to spheroidite, heat to a temperature in the vicinity of 700°C (but below the eutectoid temperature), for on the order of 24 h.

(b) For spheroidite to martensite, austenitize at a temperature of about 760°C, then quench to room temperature at a rate greater than about 140°C/s (according to Figure 10.27).

(c) For bainite to pearlite, first austenitize at a temperature of about 760°C, then cool to room temperature at a rate less than about 35°C/s (according to Figure 10.27).

(d) For pearlite to bainite, first austenitize at a temperature of about 760°C, rapidly cool to a temperature between about 220°C and 540°C, and hold at this temperature for the time necessary to complete the bainite transformation (according to Figure 10.22).

(e) For spheroidite to pearlite, same as (c) above.

(f) For pearlite to spheroidite, heat at about 700°C for approximately 20 h.

(g) For tempered martensite to martensite, first austenitize at a temperature of about 760°C, and rapidly quench to room temperature at a rate greater than about 140°C/s (according to Figure 10.27).

(h) For bainite to spheroidite, simply heat at about 700°C for approximately 20 h.