

Ex. 10-20

Using the isothermal transformation diagram for a 1.13 wt% C steel alloy (Figure 10.39), determine the final microstructure (in terms of just the microconstituents present) of a small specimen that has been subjected to the following time-temperature treatments. In each case assume that the specimen begins at 920°C (1690°F) and that it has been held at this temperature long enough to have achieved a complete and homogeneous austenitic structure.

(a) Rapidly cool to 250°C (480°F), hold for 10^3 s, then quench to room temperature.

(b) Rapidly cool to 775°C (1430°F), hold for 500 s, then quench to room temperature.

(c) Rapidly cool to 400°C (750°F), hold for 500 s, then quench to room temperature.

(d) Rapidly cool to 700°C (1290°F), hold at this temperature for 10^5 s, then quench to room temperature.

(e) Rapidly cool to 650°C (1200°F), hold at this temperature for 3 s, rapidly cool to 400°C (750°F), hold for 25 s, then quench to room temperature.

(f) Rapidly cool to 350°C (660°F), hold for 300 s, then quench to room temperature.

(g) Rapidly cool to 675°C (1250°F), hold for 7 s, then quench to room temperature.

(h) Rapidly cool to 600°C (1110°F), hold at this temperature for 7 s, rapidly cool to 450°C (840°F), hold at this temperature for 4 s, then quench to room temperature.

Isothermal transformation diagram for a 1.13 wt% C iron-carbon alloy: A, austenite; B, bainite; C, proeutectoid cementite; M, martensite; P, pearlite. [Adapted

