Problem 9-54

Consider 2.5 kg of austenite containing 0.65% carbon. It is equilibrium cooled below the eutectoid temperature.

(a) What is the proeutectoid phase?

Ferrite, i.e. α.

(b) How many kilograms of each of total ferrite and cementite form?

To do this, simply use the lever rule just below 727C.

$$W_\alpha = \frac{(6.70 - 0.65)}{(6.70 - 0.022)} \times 100\% = 90.6\%$$

The amount of ferrite in total is 0.906 times 2.5 or 2.27 kg. Consequently, the amount of cementite will be 2.50-2.27=0.23 kg.

(c) How many kg each of pearlite and proeuctectoid ferrite form?

To answer this find the relative amount of austenite at just above 727C. To do this, use the lever rule.

$$W_\gamma = \frac{0.65 - 0.022}{0.77 - 0.22} = 0.84$$

Then this changes to pearlite. We have 0.84 times 2.5 kg = 2.1 kg pearlite. The remainder of the material is 0.4 kg and it's proeutectioid ferrite.

(d) Schematically sketch the microstructure.

Pearlite

Proeutectoid
ferrite