

Homework #7
Iron Carbon System
MEMT 201

1. You have a 1.0 Kg sample of austenite containing 1.15 wt% Carbon that is cooled to just below 727 deg C. (1341 deg F). What is the pro-eutectoid phase?

Fe_3C , because the carbon content is greater than the eutectoid content.

How many Kg of ferrite and cementite are formed?

$$W_{\alpha} = (6.7 - 1.15)/(6.7 - 0.022) = 0.83 * 1.0 \text{ Kg} = 0.83 \text{ Kg}$$

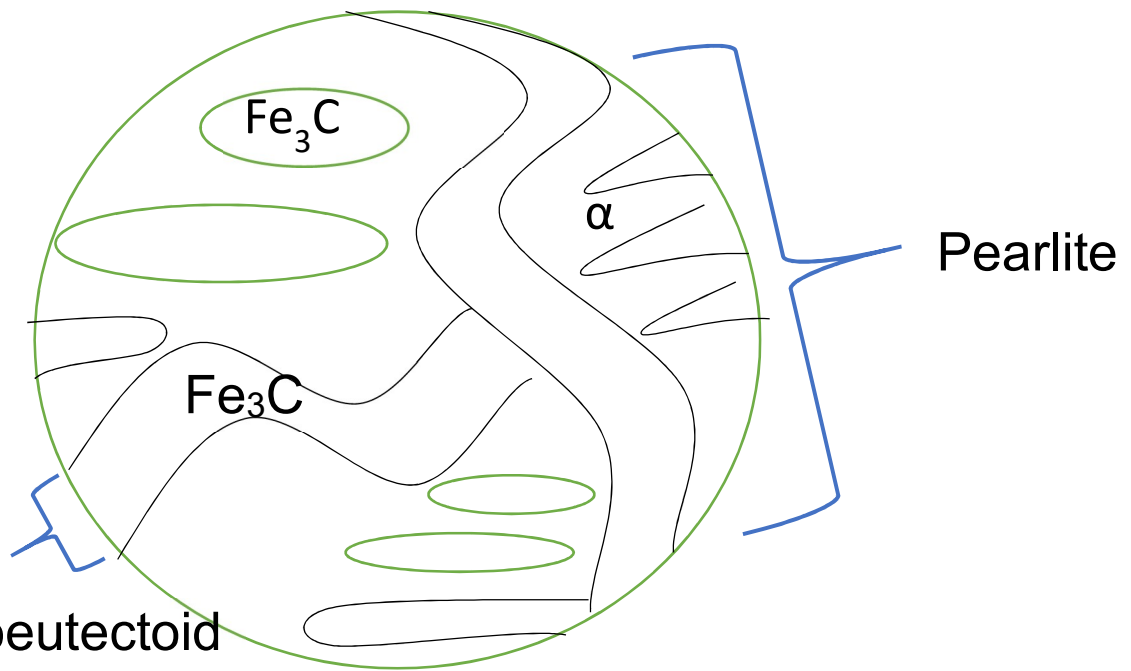
$$W_{\text{Fe}_3\text{C}} = (1.15 - 0.022)/(6.7 - 0.022) = 0.17 * 1.0 \text{ Kg} = 0.17 \text{ Kg}$$

How many Kg of Pearlite and pro-eutectoid phase are formed?

$$W_p = (6.7 - 1.15)/(6.7 - 0.76) = 0.93 * 1.0 \text{ Kg} = 0.93 \text{ Kg}$$

$$W_{\text{pro-Fe}_3\text{C}} = (1.15 - 0.76)/(6.7 - 0.76) = 0.65 * 1.0 \text{ Kg} = 0.65 \text{ Kg}$$

Sketch and label the microstructure formed.



$W_{\text{pro-Fe}_3\text{C}}$: proeutectoid
 Fe_3C phase

2. You have a steel alloy with a 1.00 wt% carbon content that is cooled to room temperature. What is the eutectoid cementite content of this sample?

$$C_{\text{pro-Fe}_3\text{C}} = (1.0 - 0.76)/(6.7 - 1.08) = 0.043 = 4.3\%$$

$$C_{\alpha\text{-Fe}_3\text{C}} = C_{\text{Fe}_3\text{C}} - C_{\text{pro-Fe}_3\text{C}} = [(1.0 - 0.022)/(6.7 - 0.022)] - 0.043 = 0.10 = 10\%$$