

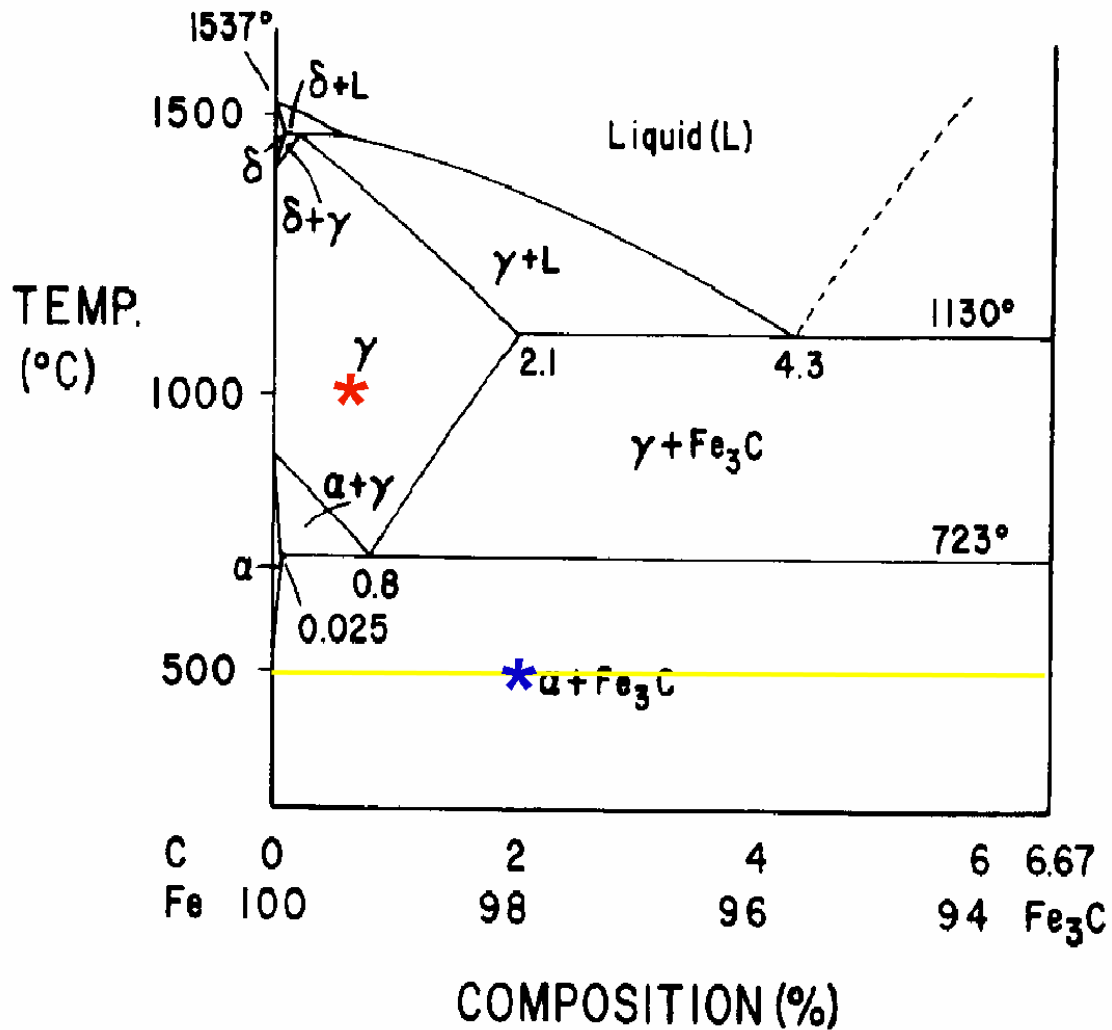
Phase Diagrams Homework Key
BE-410, Spring '06, Dr. C. S. Tritt

- Use the attached Fe-C phase diagram to determine the phase or phases present in mixture of Fe and C with a bulk composition of 0.7% carbon at 1000 °C and, if more than one phase is present, their relative amounts.

The red star in the figure below indicates the state which consists of 100% γ -phase (0.7% C in Fe).

- Repeat problem 1 for a mixture with a bulk composition of 2.0% carbon at 500 °C.

The blue star in the figure below indicates the state which consists of α -phase of nearly pure Fe and an Fe_3C phase containing 6.67% C in Fe. Use of the inverse lever rule indicates, the mass fraction of α -phase in the mixture is $(6.67 - 2.00)/(6.67 - 0.0) = 0.70$ (or 70%).



3. Use the attached Cu-Sn diagram to find the melting and freezing points of a mixture of Cu and Sn containing 55% Cu.

The red line in the figure below indicates the possible states of the mixture. The melting point is 415°C (at the yellow star) and the freezing point is about 710°C (at the green star). This problem is a bit tricky as below 415°C there are two solid phases (ϵ and η) and at 640°C the ϵ phase changes into the γ phase.

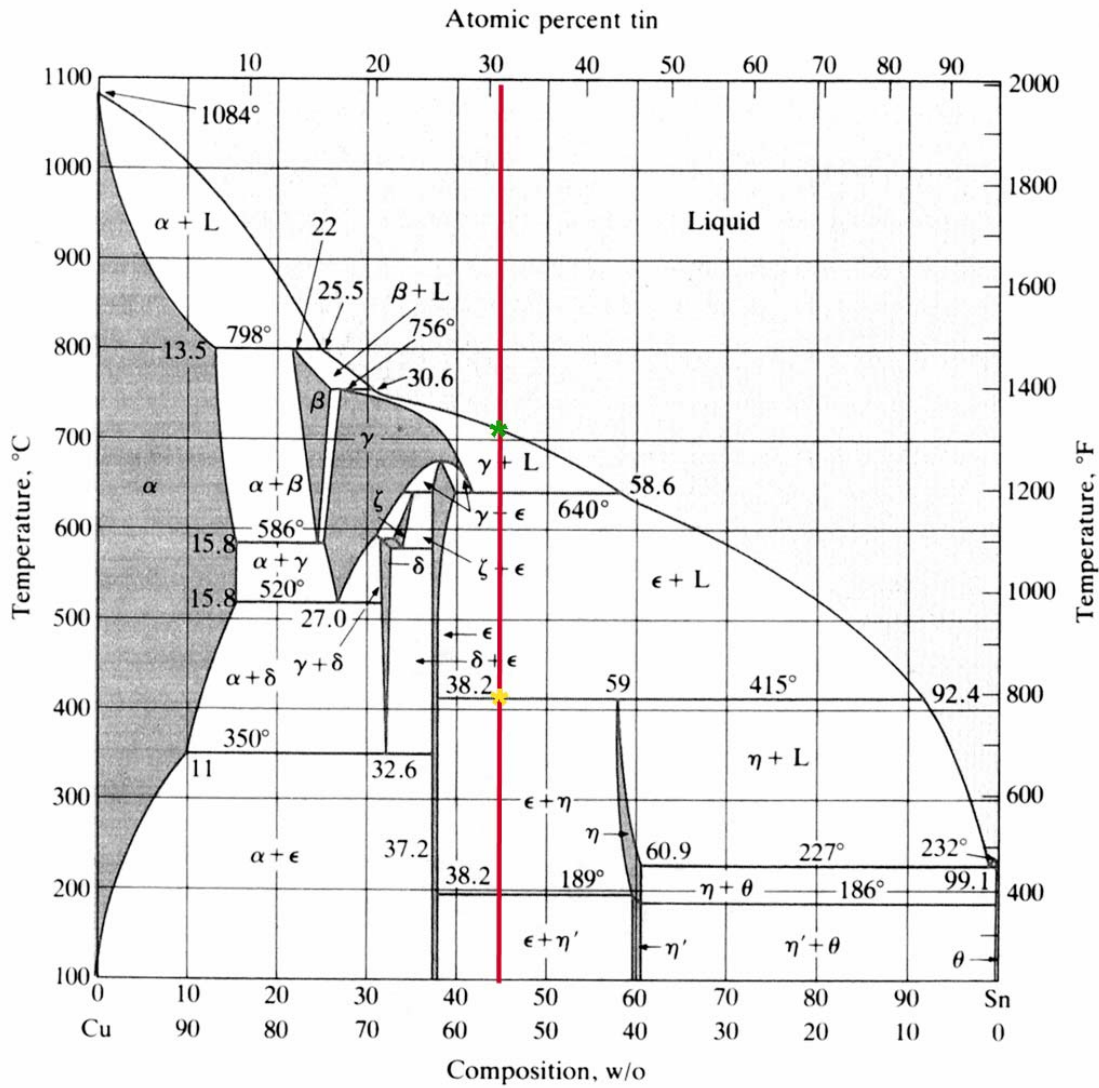


Figure 10-5.2 Cu-Sn diagram. (Adapted from *Metals Handbook*, American Society for Metals.)

From Van Vlack

4. Plot the point representing a composition of 70% Fe, 20% Ni and balance Cr on the attached phase diagram.

The green star on the figure below.

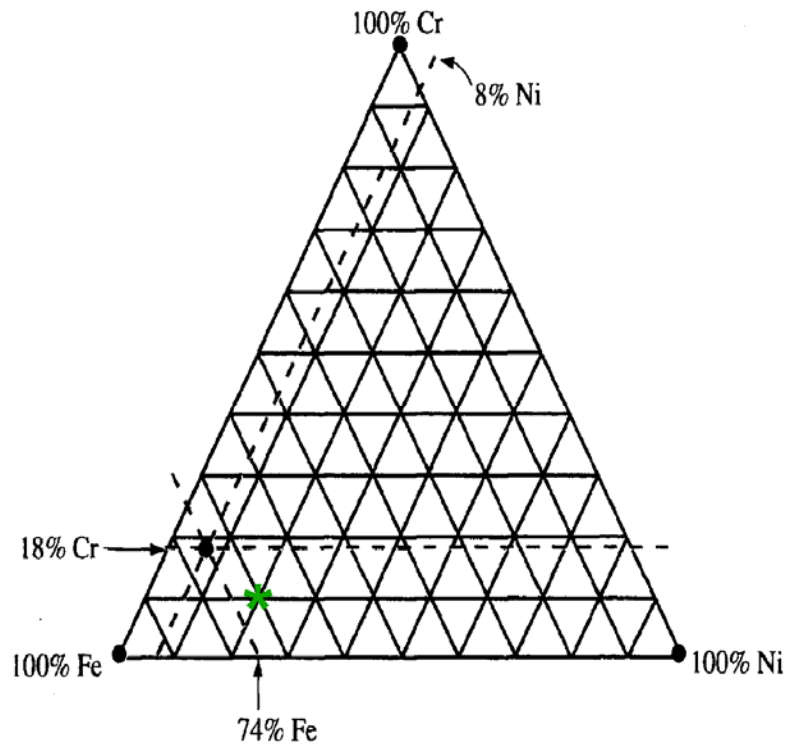


FIGURE 4.15 Location of a point in the iron–nickel–chromium ternary diagram
From Finn & Trojan

