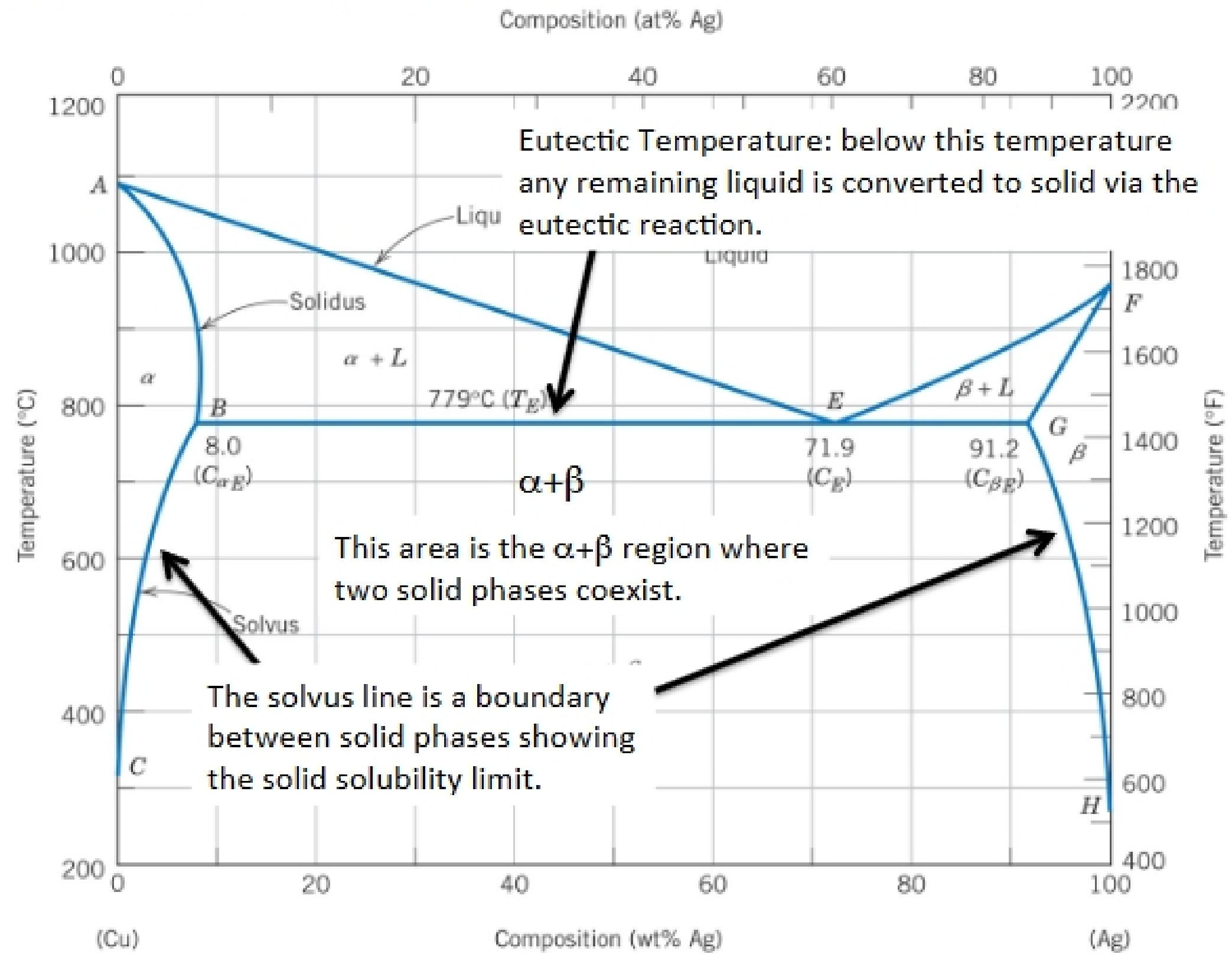


Binary Eutectic Phase Diagrams

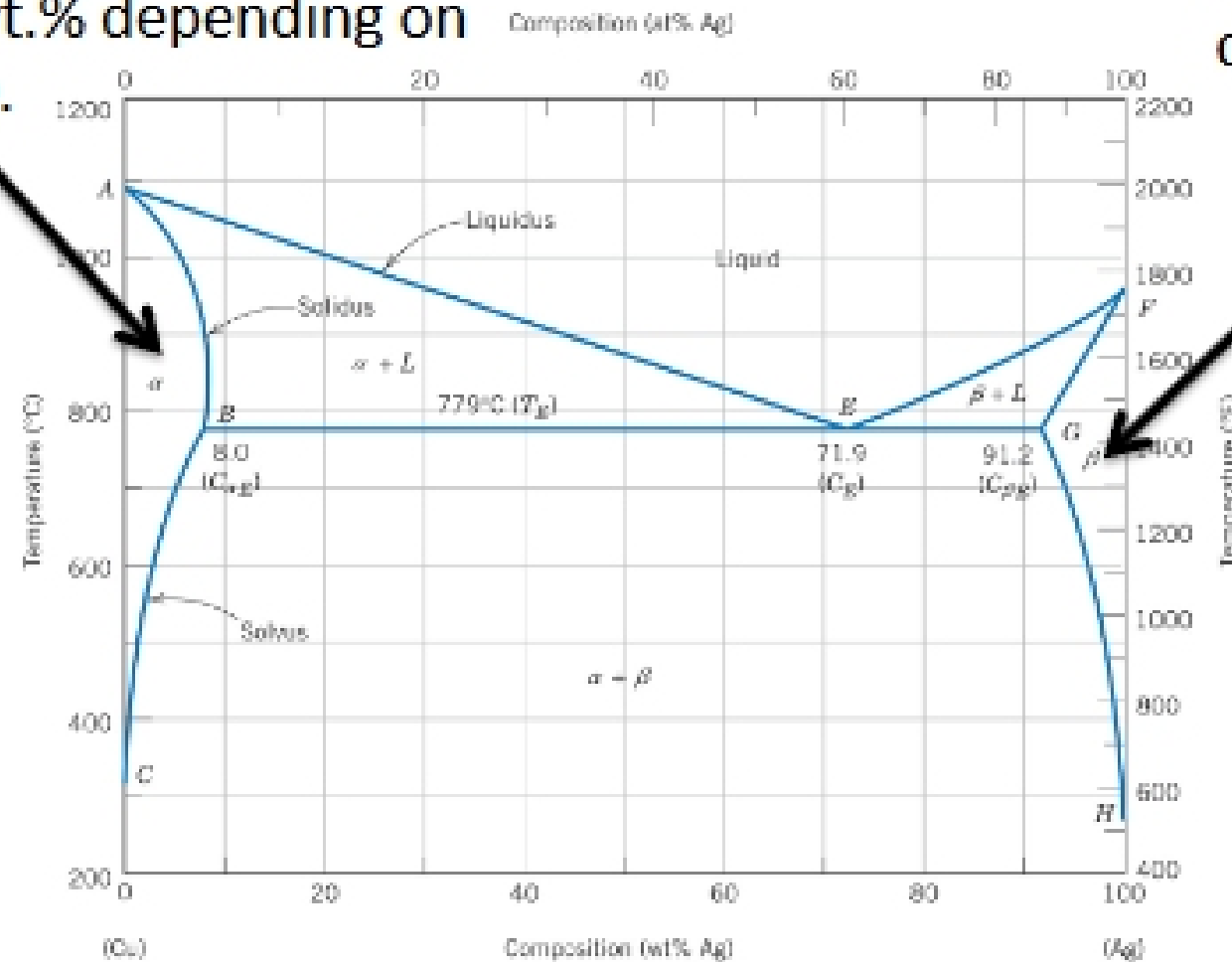
- Isomorphous systems dealt with elements that exhibit complete solid solubility, most likely due to the same crystal structure and similar atomic size.
- Now we will examine eutectic systems in which the components have limited solid solubility

The Cu-Ag binary system. Both components have a FCC structure, $r(\text{Cu})=0.128 \text{ nm}$, $r(\text{Ag})=0.144 \text{ nm}$.



The α phase is Cu with Ag in solid solution in amounts ranging from 0-8.0 wt.% depending on temperature.

The β phase is Ag with Cu in solid solution in amounts ranging from 0-8.8 wt.% (100-91.2=8.8) depending on temperature.



The $\alpha + \beta$ region contains a mixture of the two solid phases. At a given temperature, the *composition* of each phase is fixed, the the *phase fraction* of each phase varies depending on the *alloy* composition. For example, if we make an alloy that contains much more silver than copper, at 400°C we would expect to find more of the β phase (which is silver-rich) than the α phase (which is copper-rich).

Let's consider an alloy of 20 wt.% Ag and 80 wt.% Cu and see what phases are present, and determine their composition and phase fractions at 1100, 900 and 700°C.