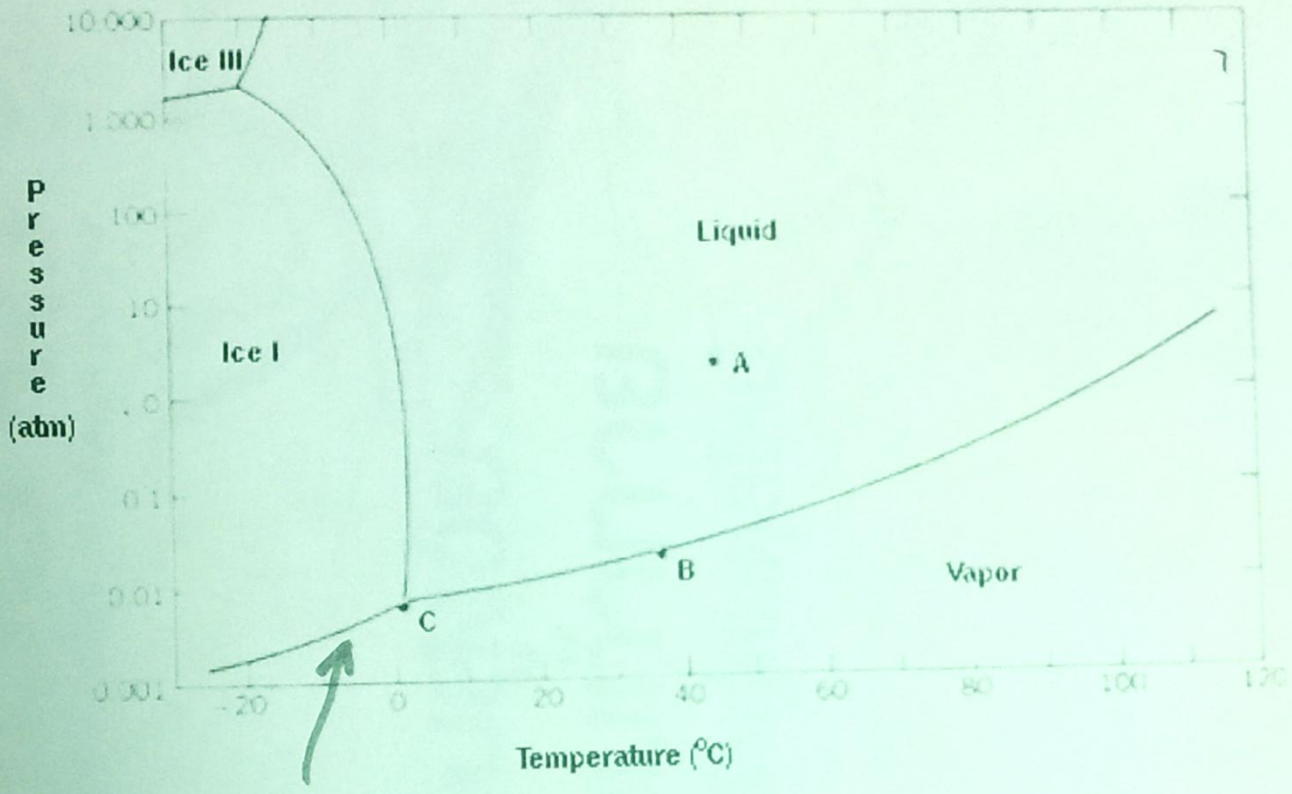
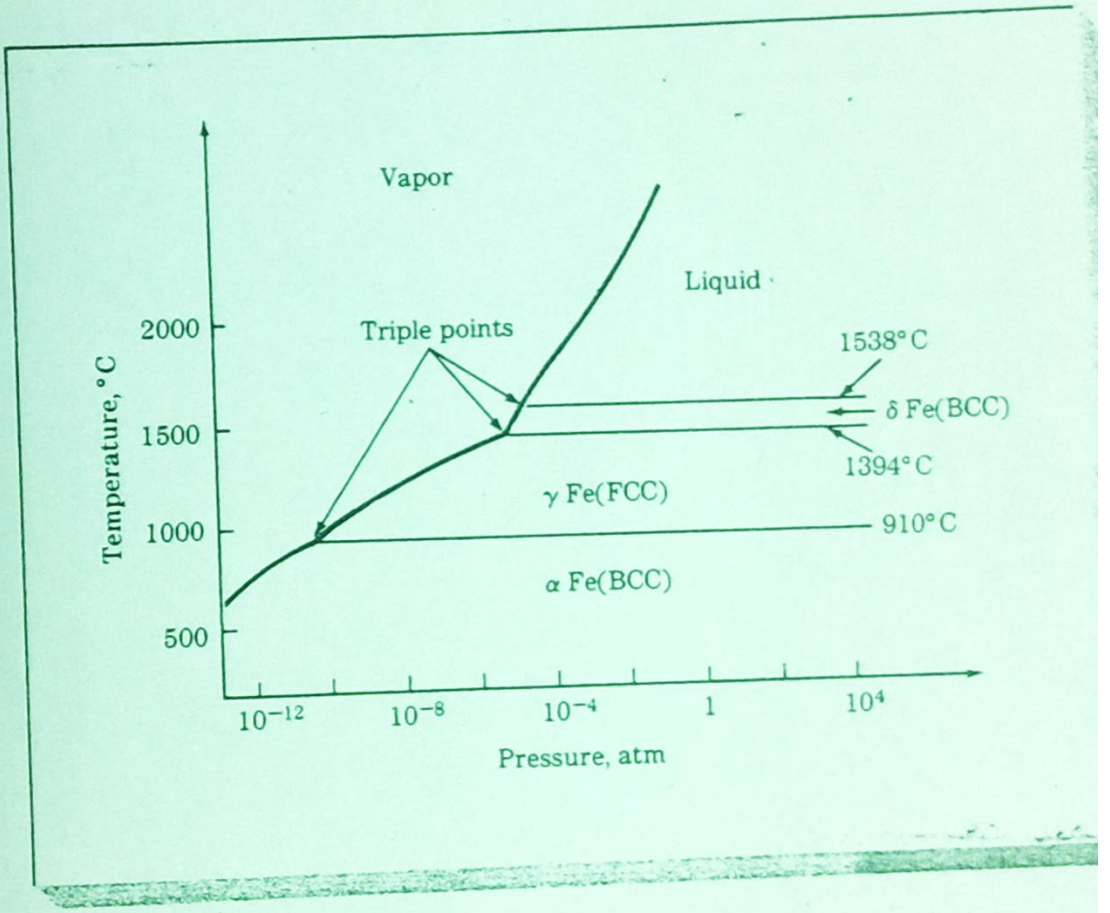
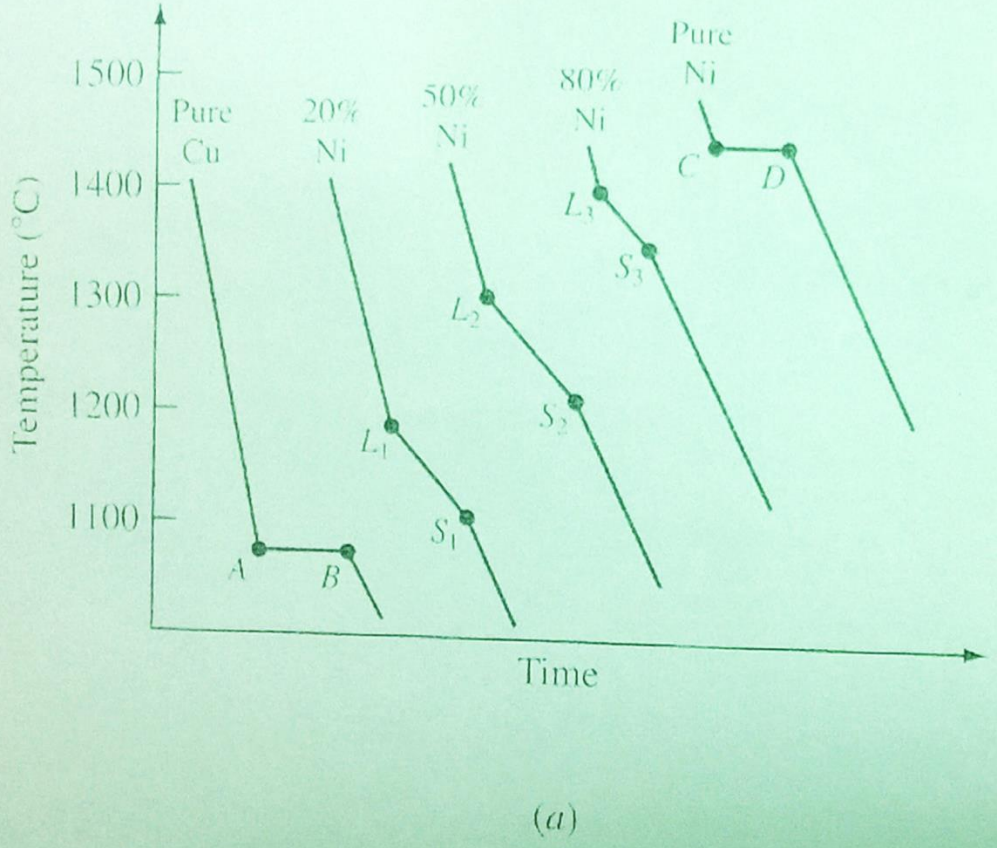


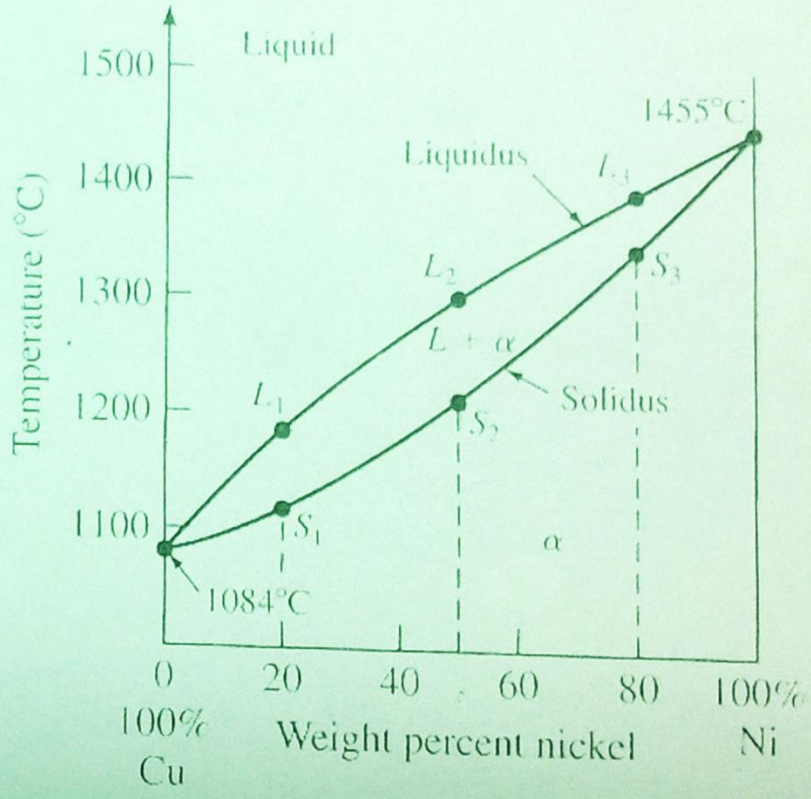
Sublimation line



URE 8.2 Approximate sure-temperature (*PT*) ilibrium phase gram for pure iron. *er-W. G. Moffatt et al., cture and Properties aterials,"* vol. I, *Wiley, p. 151.*)


Temperature (°C)
1500
1400
1300
1200
1100
Pure Cu
20% Ni
50% Ni
80% Ni
Pure Ni
A
B
C
D
L_1
L_2
L_3
S_1
S_2
S_3
Time

(*a*)


Temperature (°C)
1500
1400
1300
1200
1100
Liquid
1455°C
Liquidus
Solidus
L_1
L_2
L_3
S_1
S_2
S_3
$L + \alpha$
α
1084°C
0
20
40
60
80
100%
100% Cu
Weight percent nickel
Ni

(*b*)

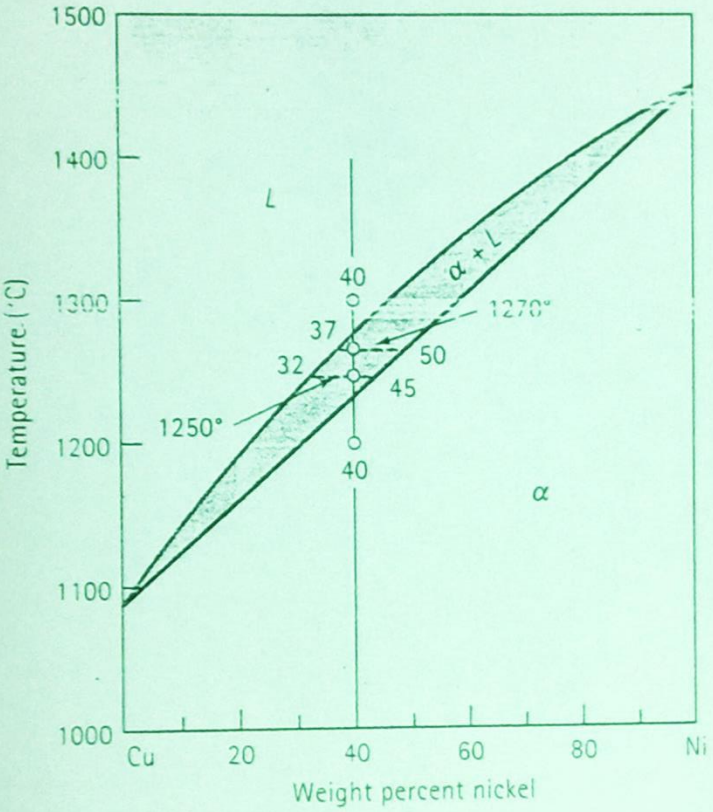


Figure 9.11
Tie lines and phase compositions for a Cu-40% Ni alloy at several temperatures (*for* Example 9.7).

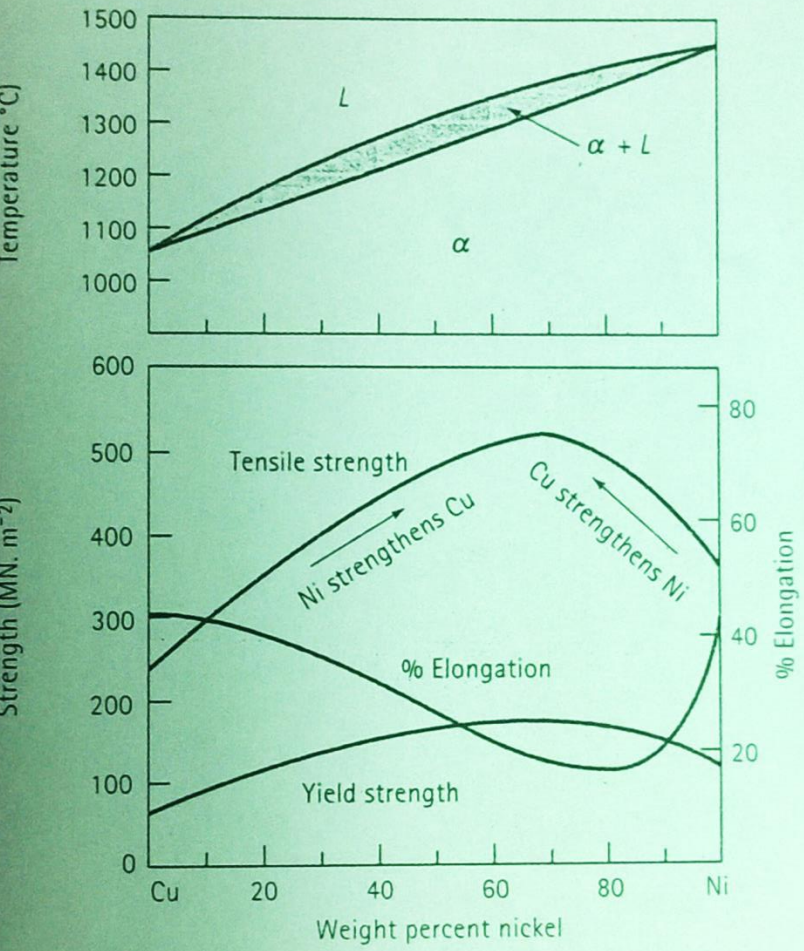


Figure 9.13
The mechanical properties of copper-nickel alloys. Copper is strengthened by up to 60% Ni and nickel is strengthened by up to 40% Cu.

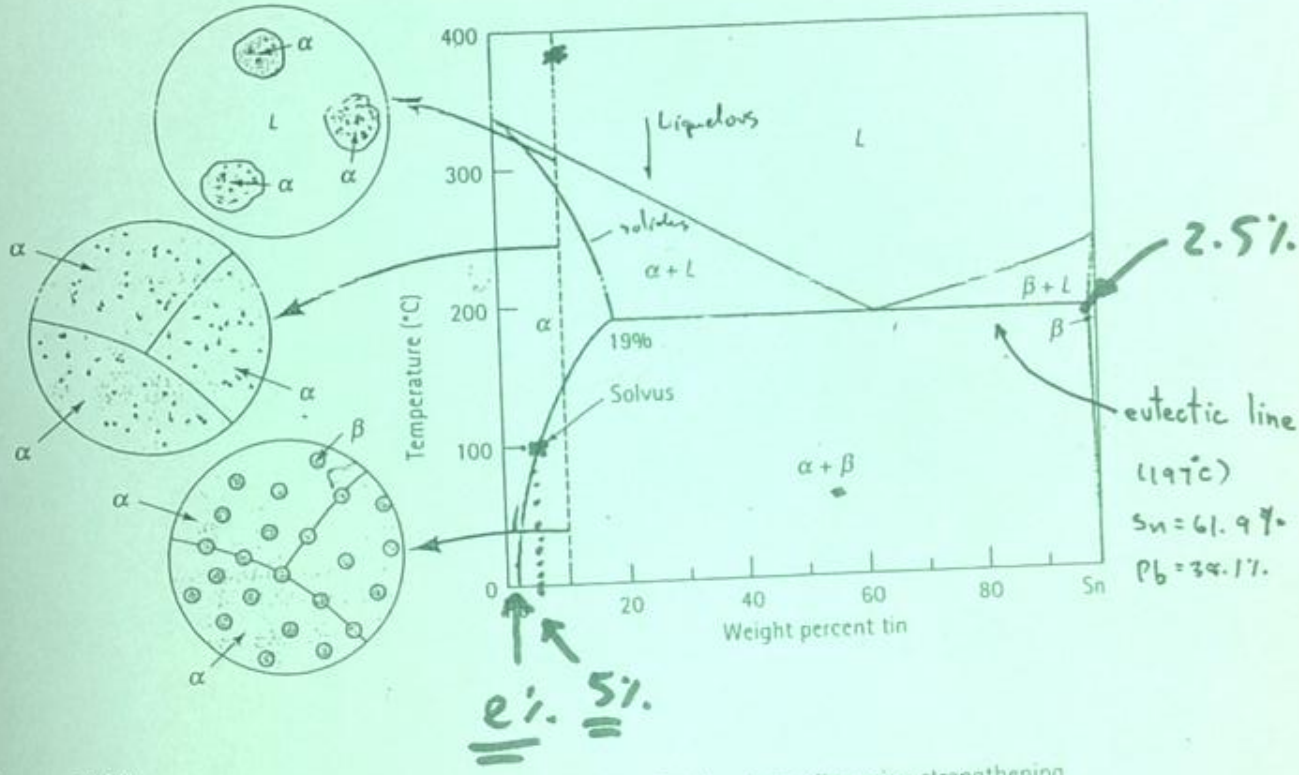
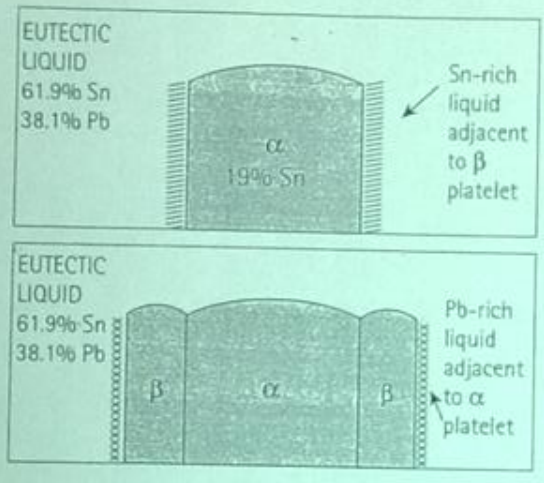
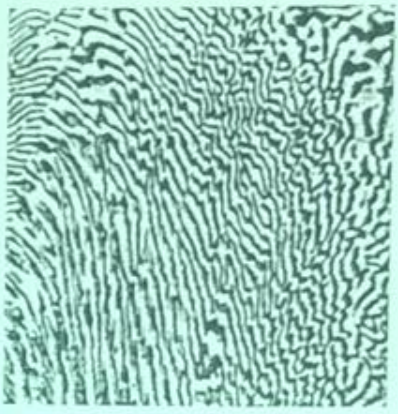


Figure 10.10
Solidification, precipitation, and microstructure of a Pb-10% Sn alloy. Some dispersion strengthening occurs as the β solid precipitates.

"lamellar"



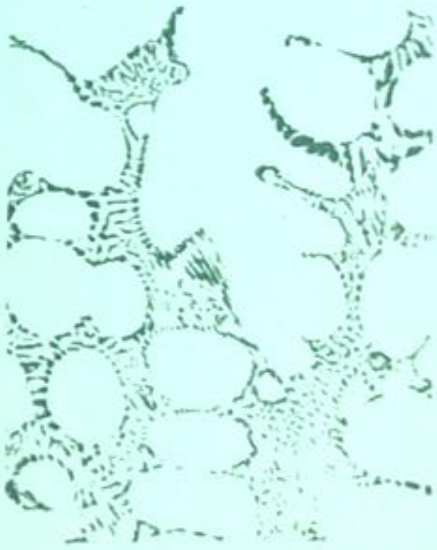
(a)



(b)

Figure 10.12
(a) Atom redistribution during lamellar growth of the lead-tin eutectic. Lead atoms from the liquid preferentially diffuse to the platelets and/or the tin atoms diffuse away creating an α platelet upon solidification. (b) Photomicrograph of the lead-tin eutectic microconstituent (× 400).

(a)



(b)

Figure 10.15
(a) A hypoeutectic lead-tin alloy. (b) A hypereutectic lead-tin alloy. The dark constituent is the lead-rich solid α, the light constituent is the tin-rich solid β, and the fine plate structure is the eutectic (× 400).

10.4 Phase Diagrams Containing Three-Phase Reactions

Many combinations of two elements produce more complicated phase diagrams than the isomorphous systems. These systems contain reactions that involve three separate phases, five of which are defined in Figure 10.6. Each of the reactions can be identified in a complex phase diagram by the following procedure:

1. Locate a horizontal line on the phase diagram. The horizontal line, which indicates the presence of a three-phase reaction, represents the temperature at which the reaction occurs under equilibrium conditions.

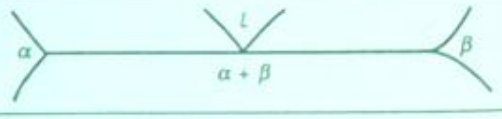
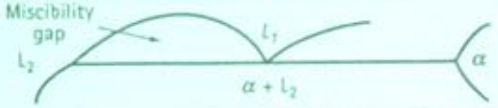
Eutectic	$L \rightarrow \alpha + \beta$	
Peritectic	$\alpha + L \rightarrow \beta$	
Monotectic	$L_1 \rightarrow L_2 + \alpha$	
Eutectoid	$\gamma \rightarrow \alpha + \beta$	
Peritectoid	$\alpha + \beta \rightarrow \gamma$	

Figure 10.6
The five most important three-phase reactions in binary phase diagrams. L indicates a liquid phase.

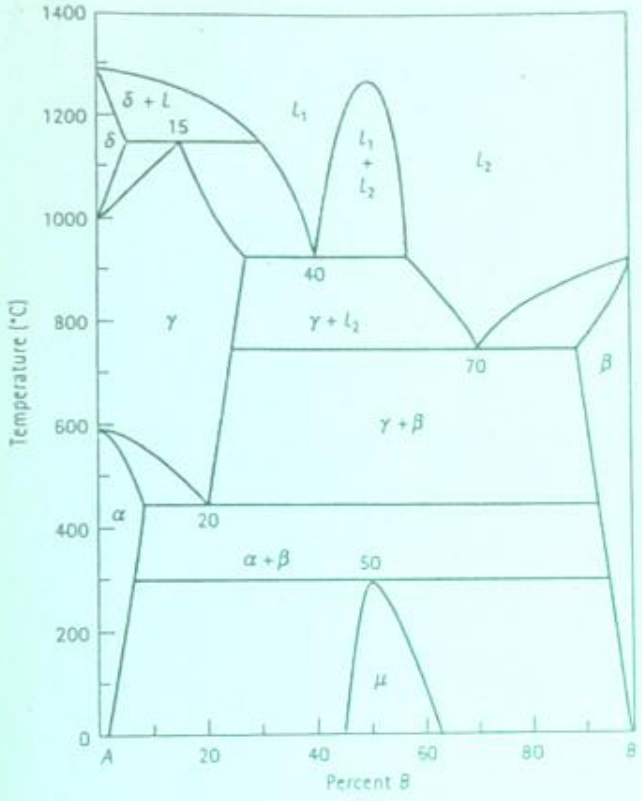


Figure 10.7
A hypothetical phase diagram (*for* Example 10.2).

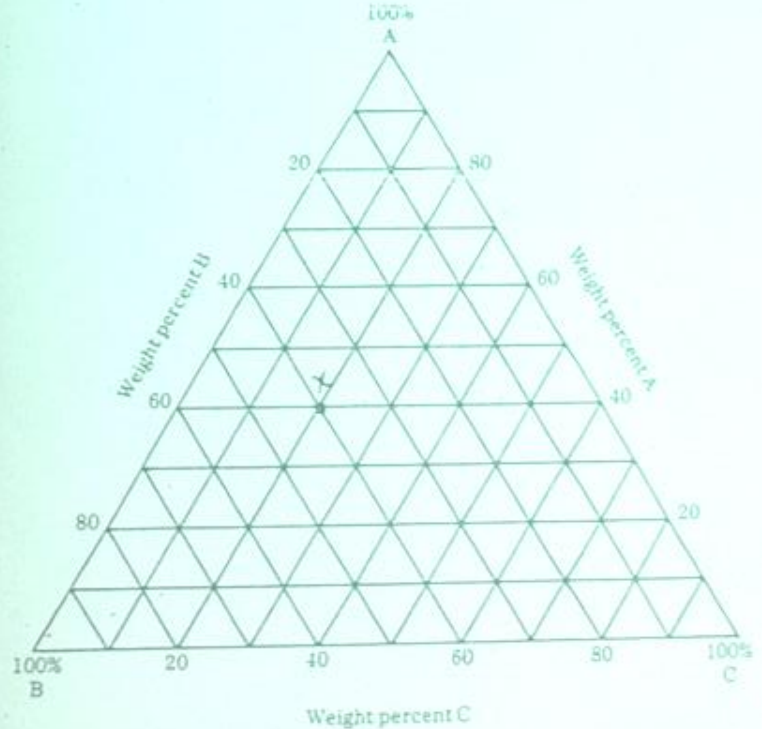


FIGURE 8.28
Composition base for a ternary phase diagram for a system with pure components A, B, and C.