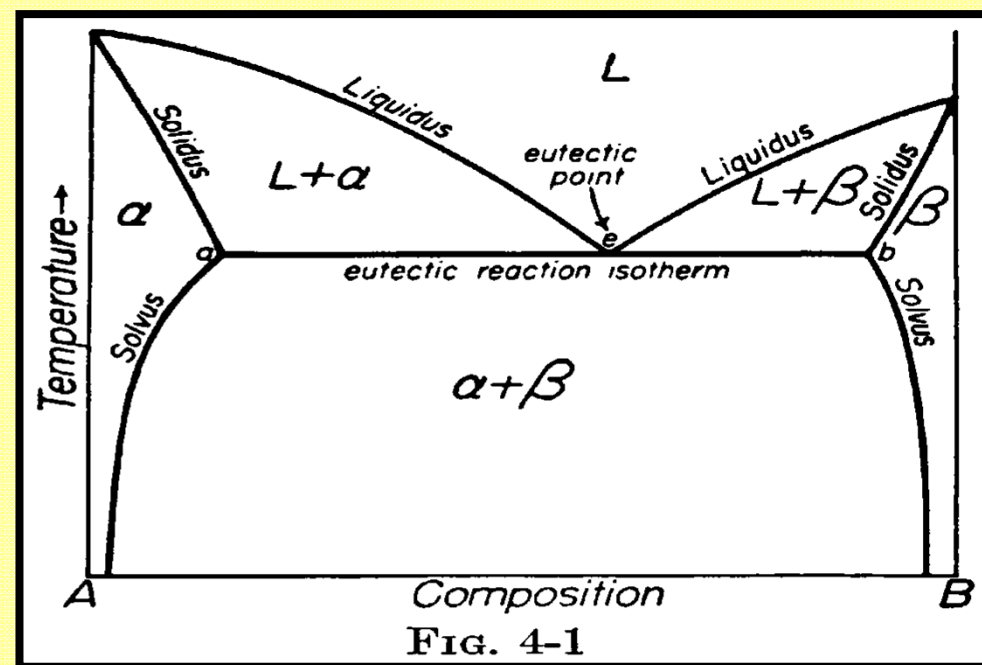
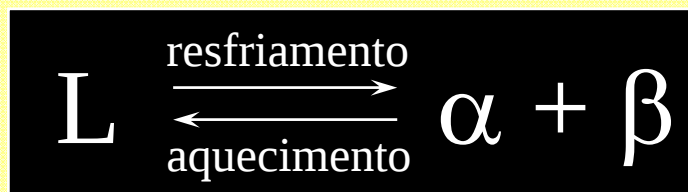
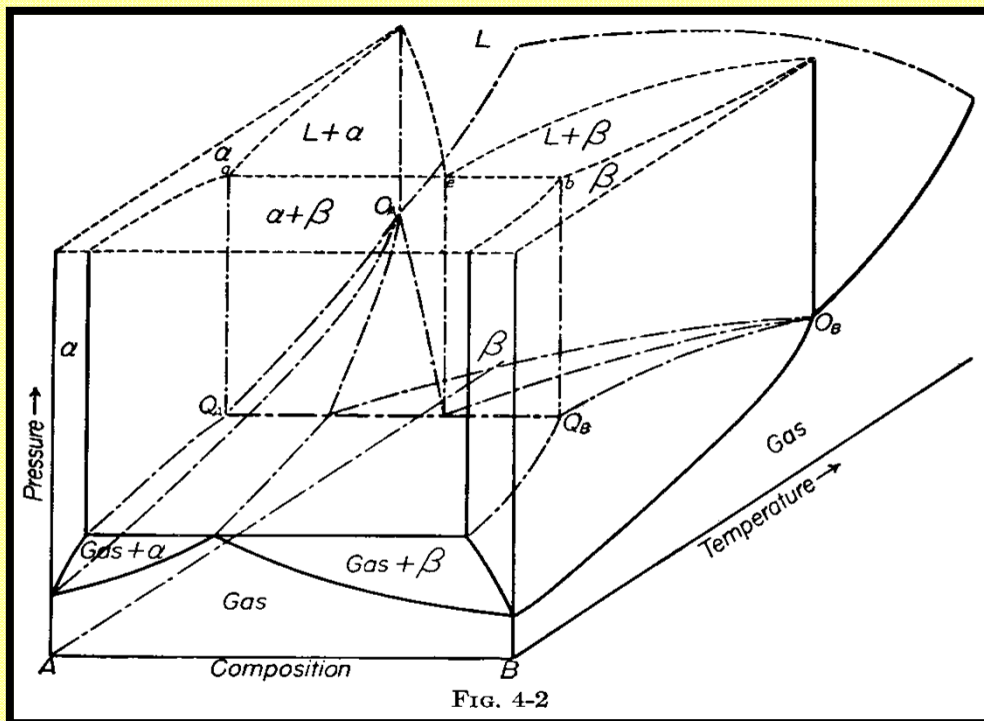


4 - SISTEMAS EUTÉTICOS BINÁRIOS



4.1 - Aplicação da regra das fases

$$P + F = C + 1$$

(pressão constante)

- equilíbrio invariante:

$$F = 0; \quad C = 2; \quad P = 3$$

(dado pela linha eutética “a-e-b”)

- equilíbrio univariante:

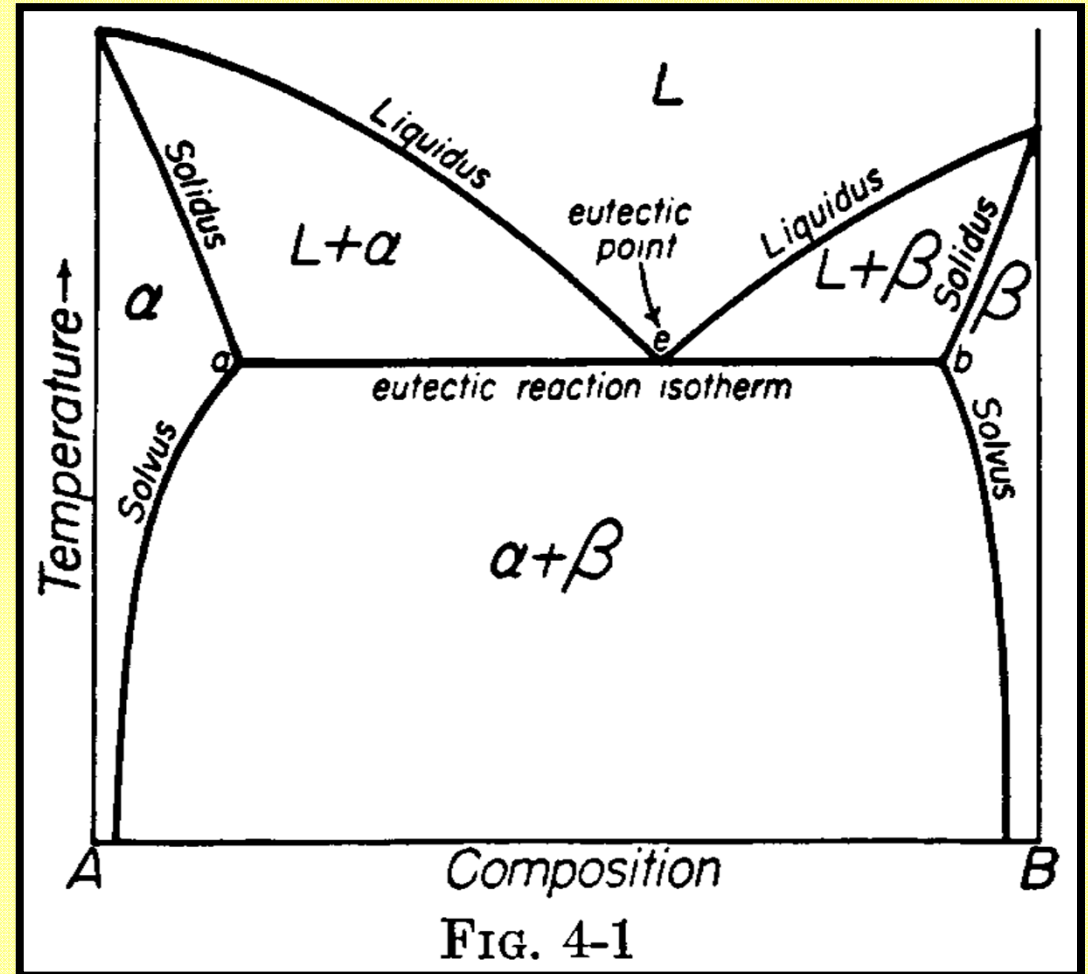
$$F = 1; \quad C = 2; \quad P = 2$$

(regiões $L+\alpha$, $L+\beta$ e $\alpha+\beta$)

- equilíbrio bivariante:

$$F = 2; \quad C = 2; \quad P = 1$$

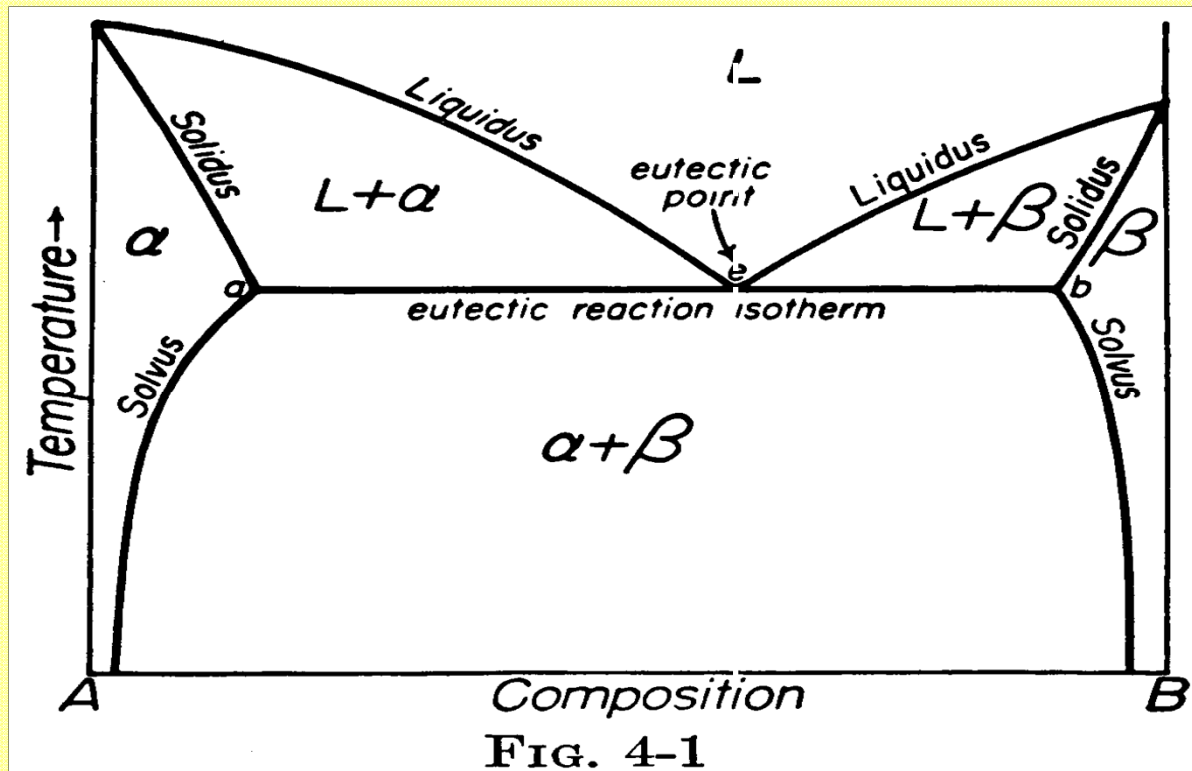
(regiões marcadas como α , β e L)



4.2 - Regra dos limites de regiões de equilíbrio

Qualquer região de P fases em equilíbrio só pode ser limitada por regiões de $P \pm 1$ fases.

4.3 - Liga de composição eutética



As quantidades relativas das fases α e β , a um infinitésimo de temperatura abaixo da temperatura eutética são dadas por

$$\% \alpha = \frac{eb}{ab} \times 100$$

$$\% \beta = \frac{ae}{ab} \times 100$$

No resfriamento de uma liga de composição eutética através da temperatura eutética ocorre a decomposição do líquido L em duas fases sólidas α e β . No aquecimento, as fases α e β reagem para formar o líquido de composição dada pelo ponto eutético. Estas transformações são expressas por

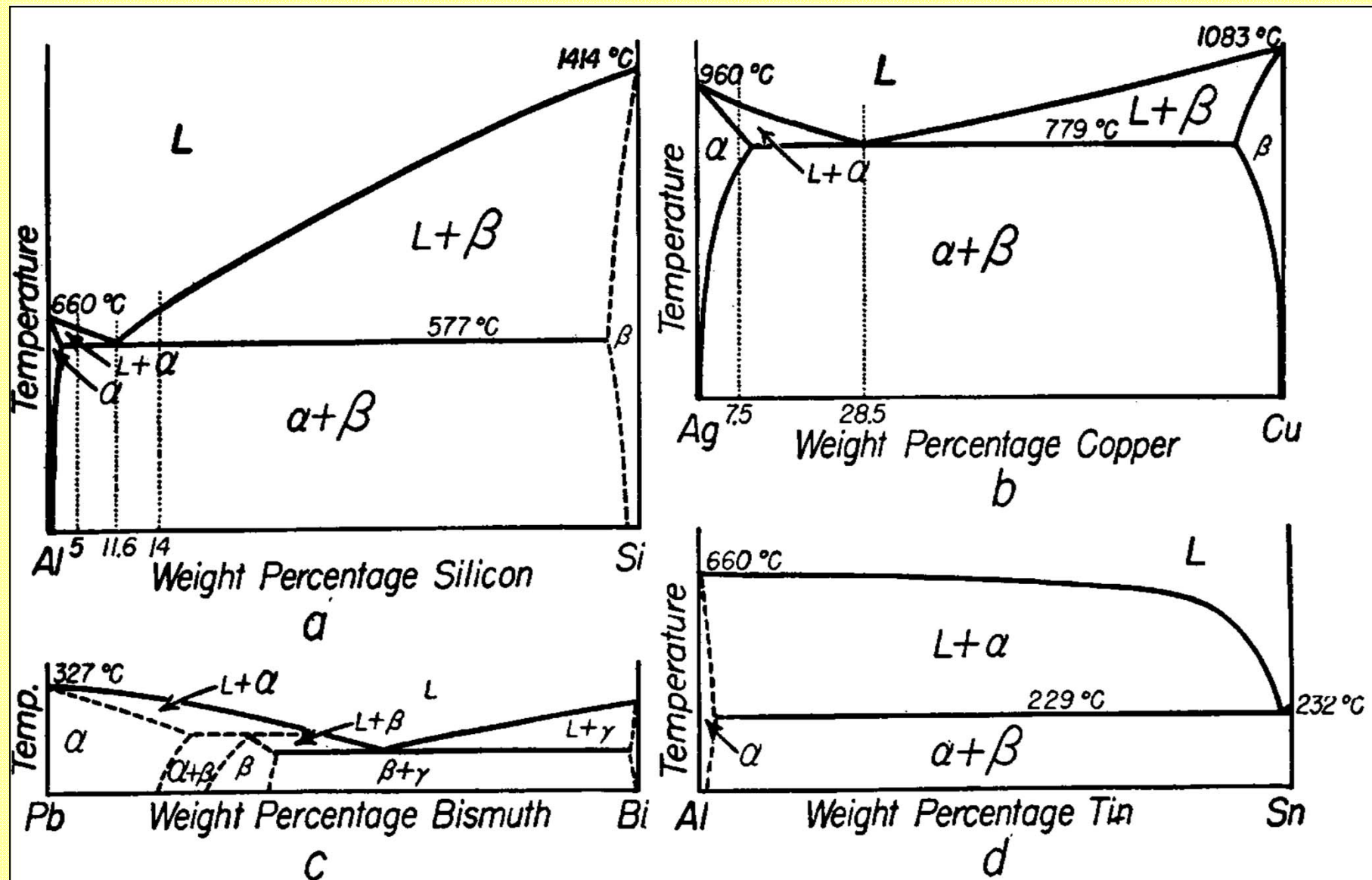


FIG. 4-5. Phase diagrams of some typical eutectic-type systems.

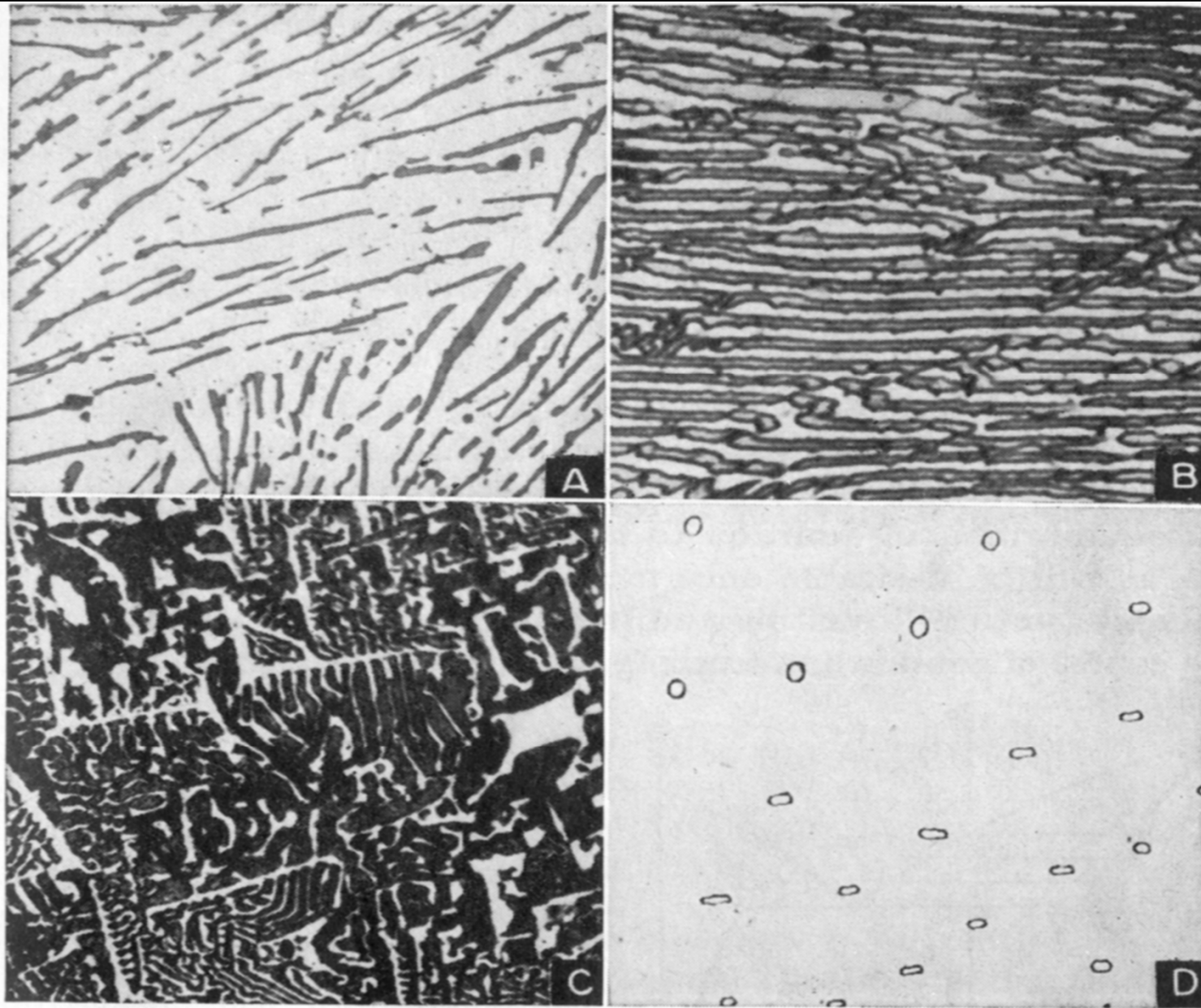


FIG. 4-6. Typical microstructures of some cast eutectic alloys: (A) Al-Si 11.6%, magnification 500; (B) Ag-Cu 28.5%, magnification 2,000; (C) Pb-Bi 56.5%, magnification 100; and (D) Al-Sn 99.5%, magnification 650. See also Fig. 4-5.

4.4 - Ligas hipoeutéticas e hipereutética

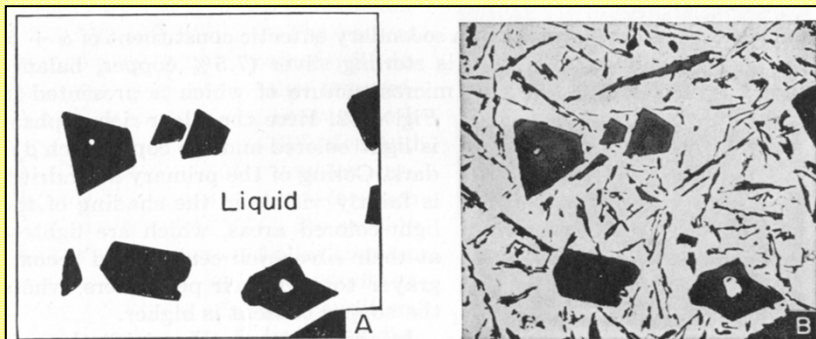
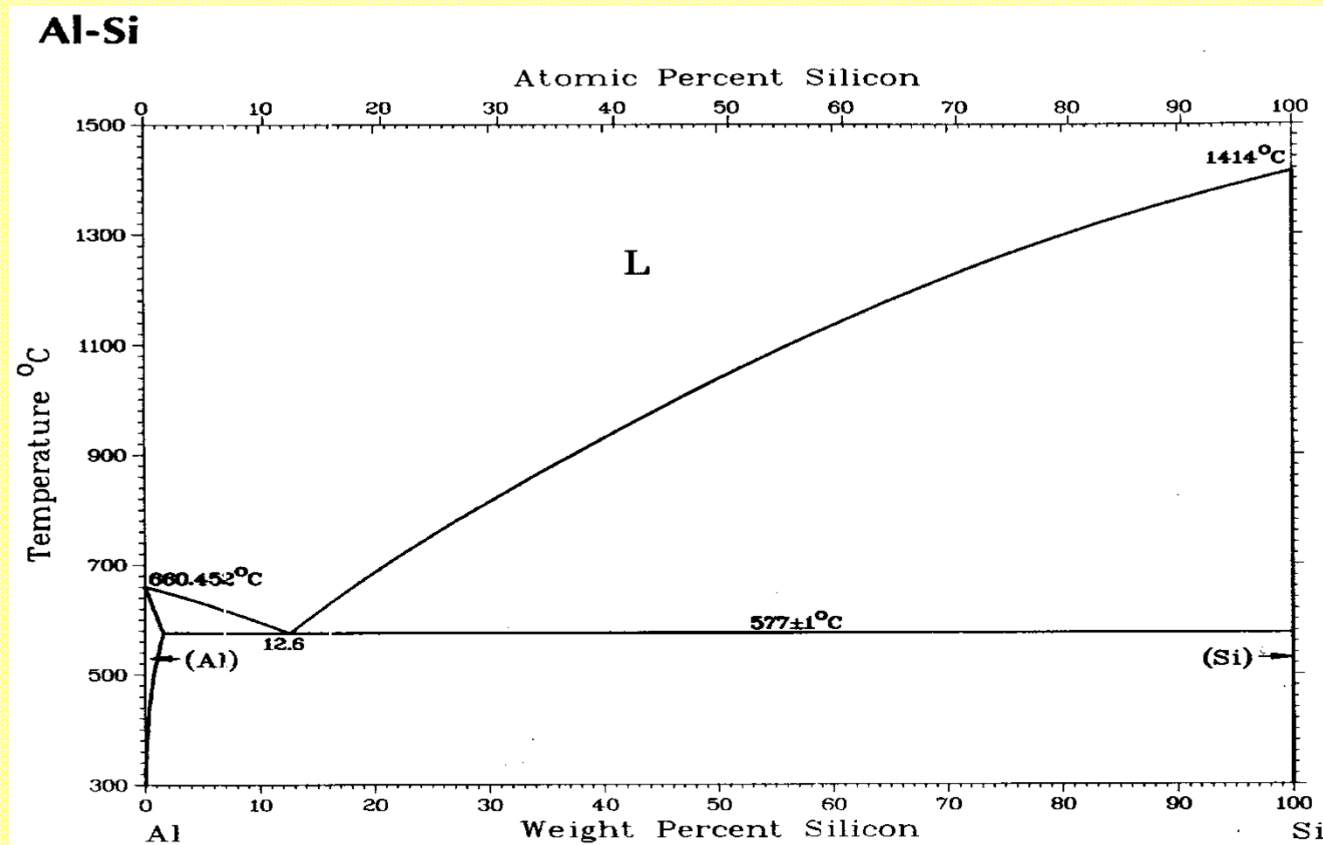


FIG. 4-10. Hypereutectic Al-Si 14% alloy. Sketch A shows the location of primary β and the eutectic liquid; photograph B shows the final cast microstructure. Magnification 100.

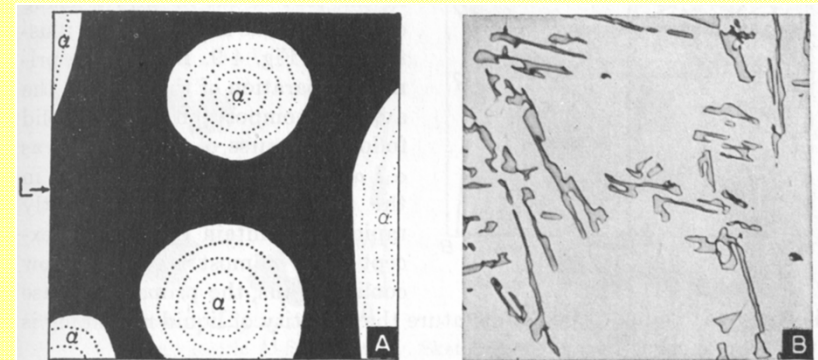
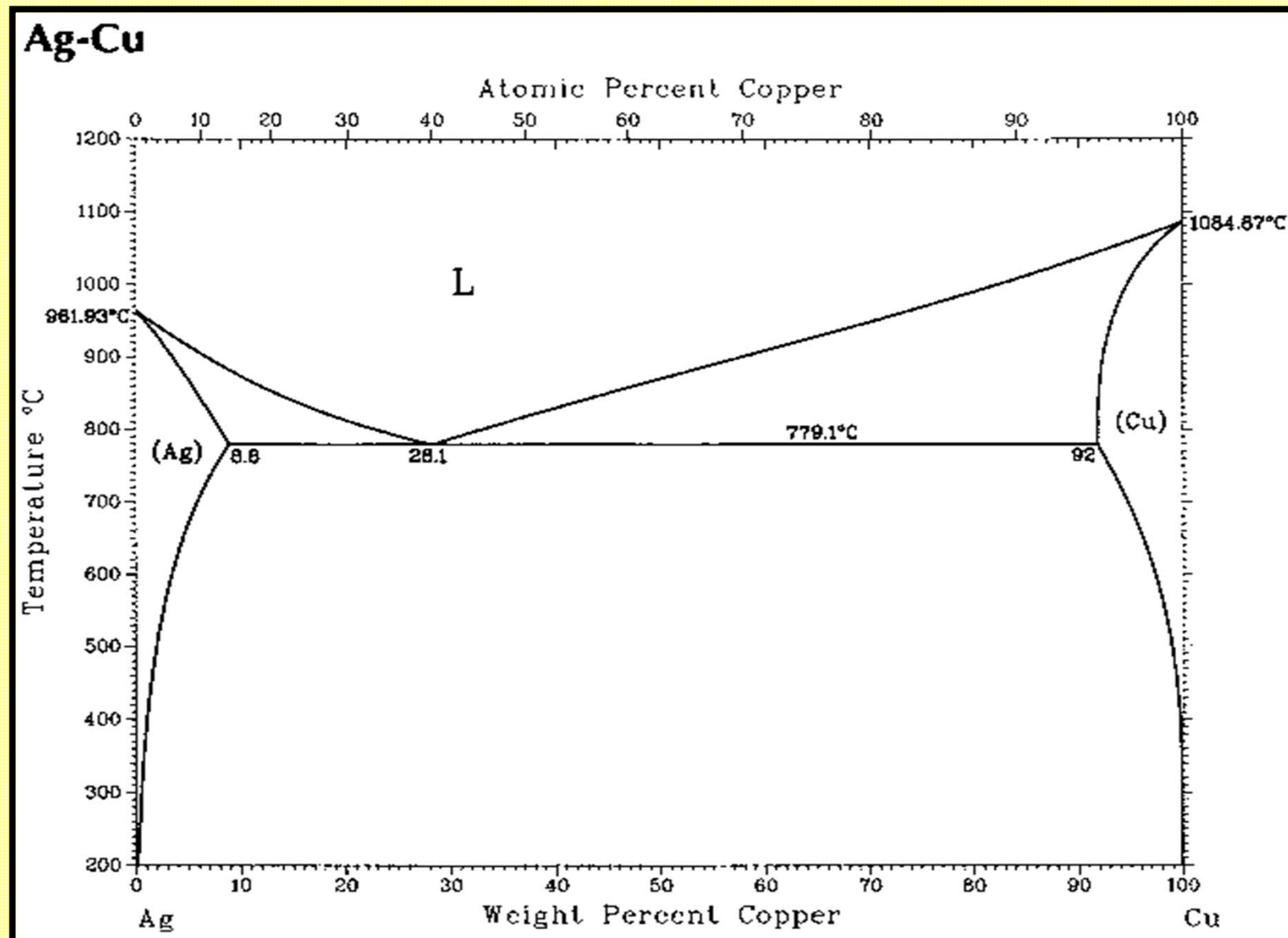


FIG. 4-8. Hypoeutectic Al-Si 5% alloy. Sketch a indicates the location of the primary α and the eutectic liquid; the final microstructure at the end of freezing is shown in b. Magnification 500.

4.5 - Soluções sólidas terminais



4.5 - Soluções sólidas terminais

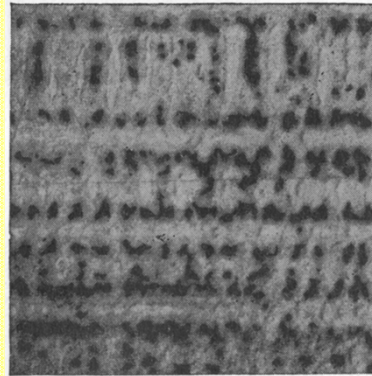
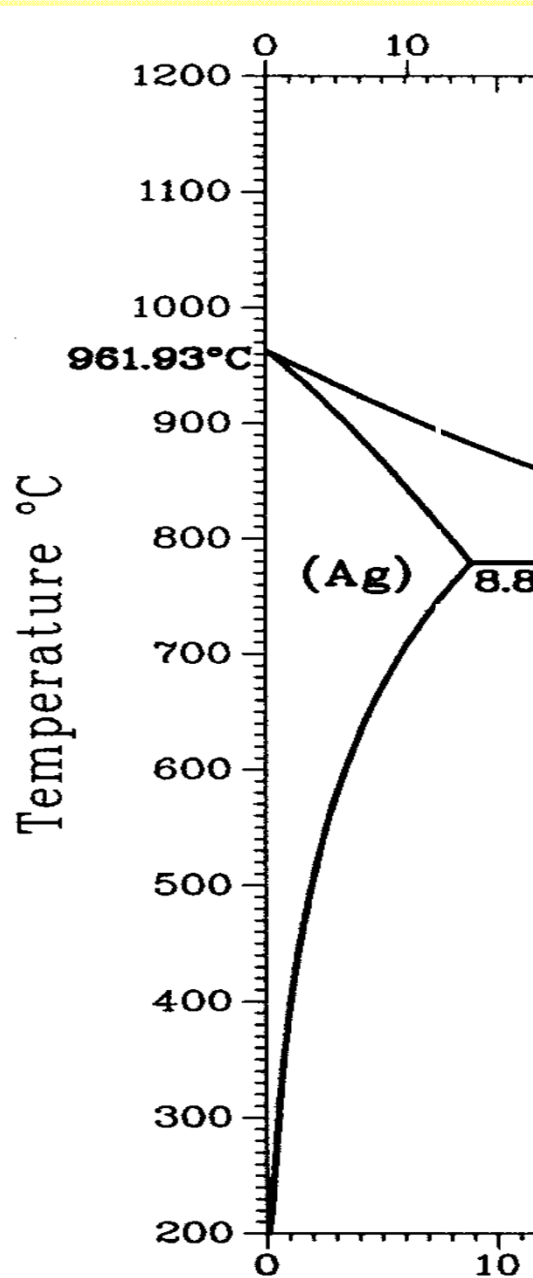


FIG. 4-12. Sterling silver (7.5% Cu) as cast. Light areas, shading from white to light gray, are cored dendrite areas, silver-rich at their centers; dark areas are divorced eutectic. Magnification 100.

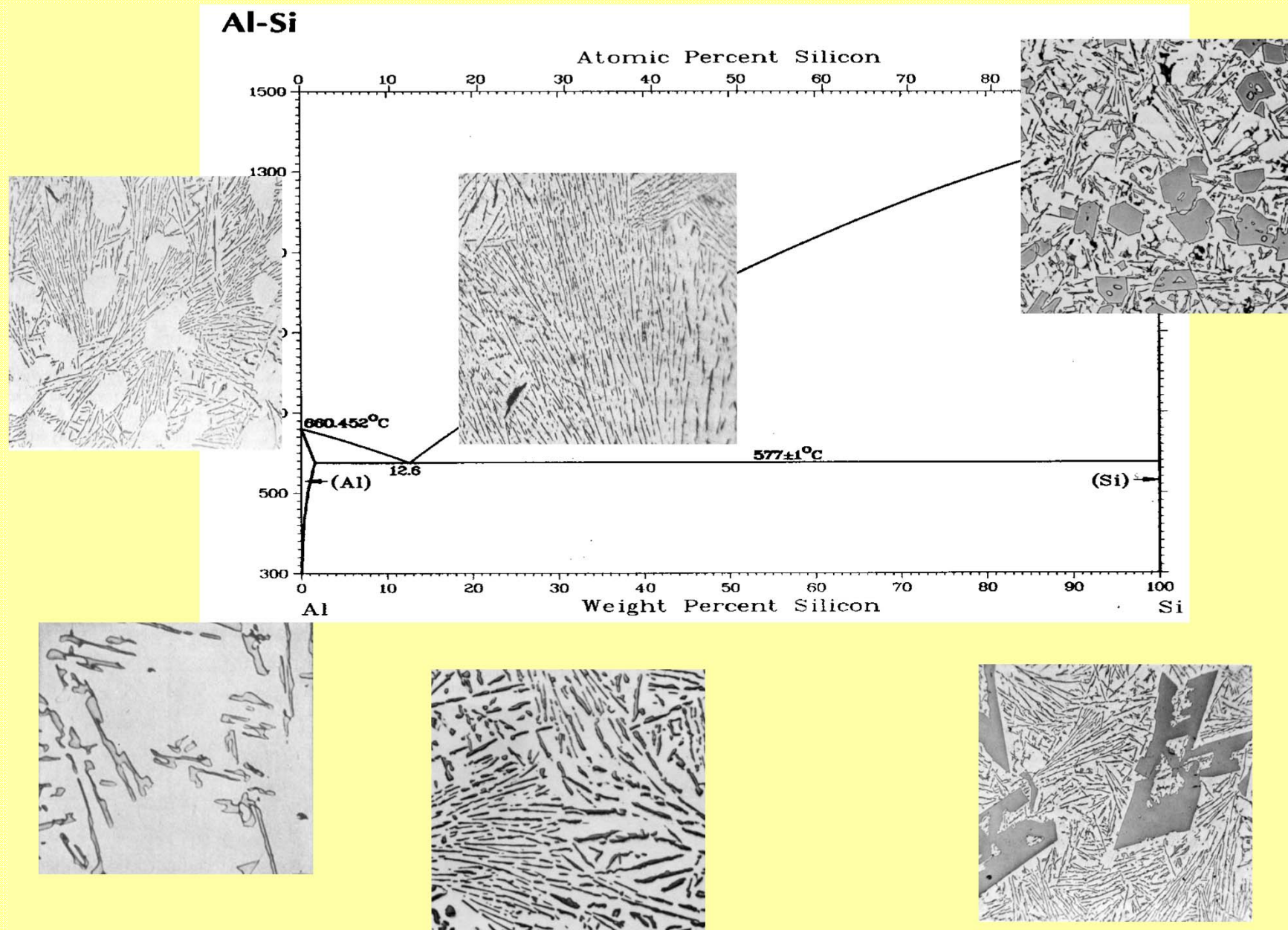


FIG. 4-13. Same as Fig. 4-12, homogenized by heat treatment just below the eutectic temperature and quenched to room temperature; only the silver-rich solid solution is present in this structure. Magnification 100.



FIG. 4-14. Same as Fig. 4-13, but slowly cooled from the homogenizing temperature. Parallel platelets of copper-rich solid solution have formed upon certain crystallographic planes of the parent silver-rich solid solution, producing a Widmanstätten structure. Magnification 1,000.

4.6 - Exemplos de microestruturas eutéticas



Al-Cu

