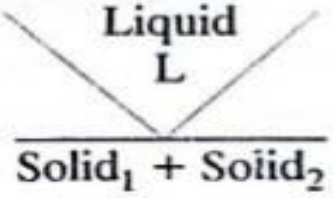
- # EUTECTIC SYSTEM

  - In an eutectic reaction, when a liquid solution of fixed composition, solidifies at a constant temperature, forms a mixture of two or more solid phases without an intermediate pasty stage. This process reverses on heating.

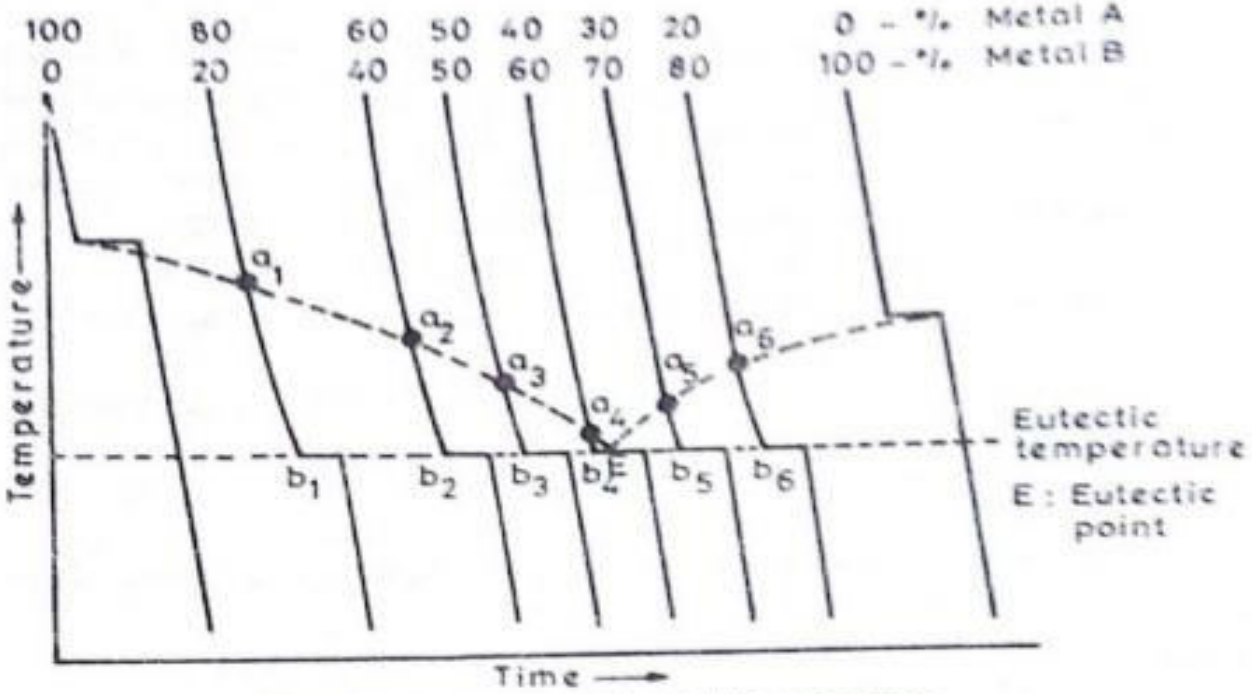
$$\text{Liquid} \underset{\text{Heating}}{\overset{\text{Cooling}}{\rightleftharpoons}} \text{Solid}_1 + \text{Solid}_2$$



  - In eutectic system, there is always a specific alloy, known as eutectic composition, that freezes at a lower temperature than all other compositions.
  - At the eutectic temperature, two solids form simultaneously from a single liquid phase.
  - The eutectic temperature and composition determine a point on the phase diagram called the eutectic point.

– Binary alloy eutectic system can be classed as:

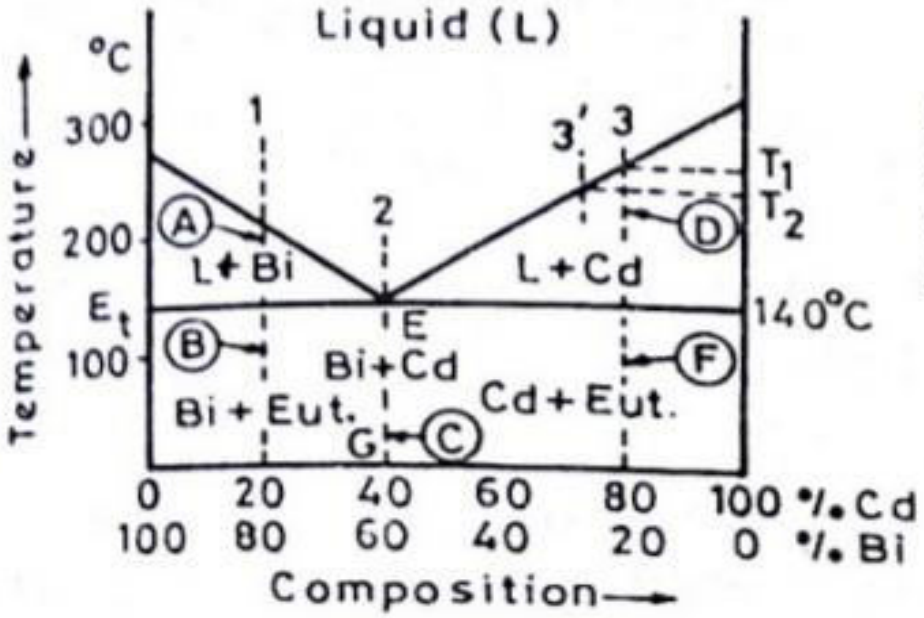
1. One in which, two metals are completely soluble in the liquid state but are insoluble in each other in the solid state.
2. two metals are completely soluble in the liquid state but are partly soluble in each other in the solid state



Cooling curves for two metals insoluble in solid state.

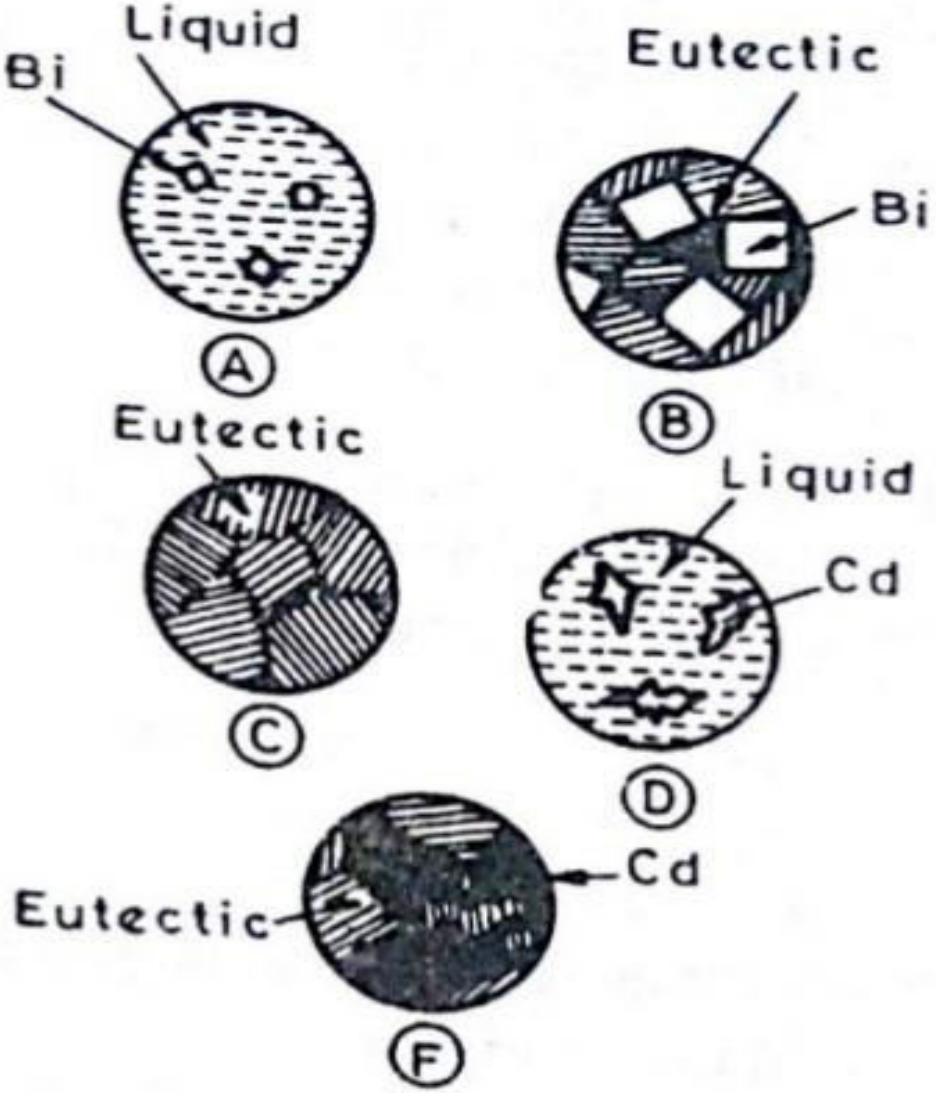
1. Two metals completely soluble in the liquid state but completely insoluble in the solid state.

   – Technically, no two metals are completely insoluble in each other. However, in some cases the solubility is so restricted that for practical purposes they may be considered insoluble.



E : Eutectic Point
E_t : Eutectic Temperature.
G : Eutectic Composition (40% Cd–60% Bi)
Eut: Eutectic.

The Bismuth-Cadmium Equilibrium Diagram.


Liquid
Bi
A
Eutectic
Bi
B
Eutectic
C
Liquid
Cd
D
Cd
Eutectic
F