

15.6.2012 ~~Thurs~~ Friday

P-1

Binary Isomorphous Alloy Systems

A mixture of two metals is called a binary alloy and constitutes a two component system. Pure copper is a one component system.

Copper and nickel is a binary alloy of two-component system.

Iron and Iron Carbide (compound) is a two component system.

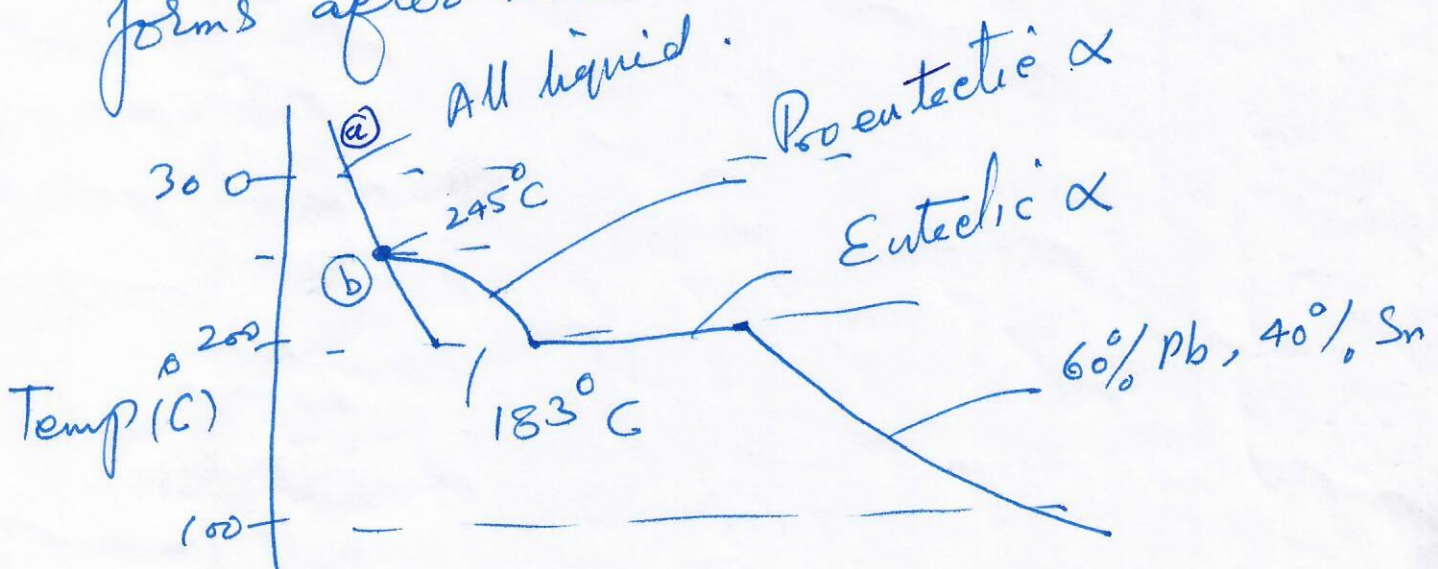
In some binary systems the two elements are soluble in each other in solid and liquid state and have same crystal structure and are called isomorphous systems.

Binary Eutectic Alloy Systems

Slow cooling of a 60% Pb - 40% Sn alloy.
from 300°C to room temp.

when temp goes down from 300°C (a) point (a)
alloy is liquid only until the liquidus line
is intersected at point (b) - (245°C)

At 245°C solid solution (α), containing 12% Sn will begin to precipitate from the liquid. The first solid to form in this type of alloy is called primary or proeutectic α . It is called so because (α) solid forms after this.

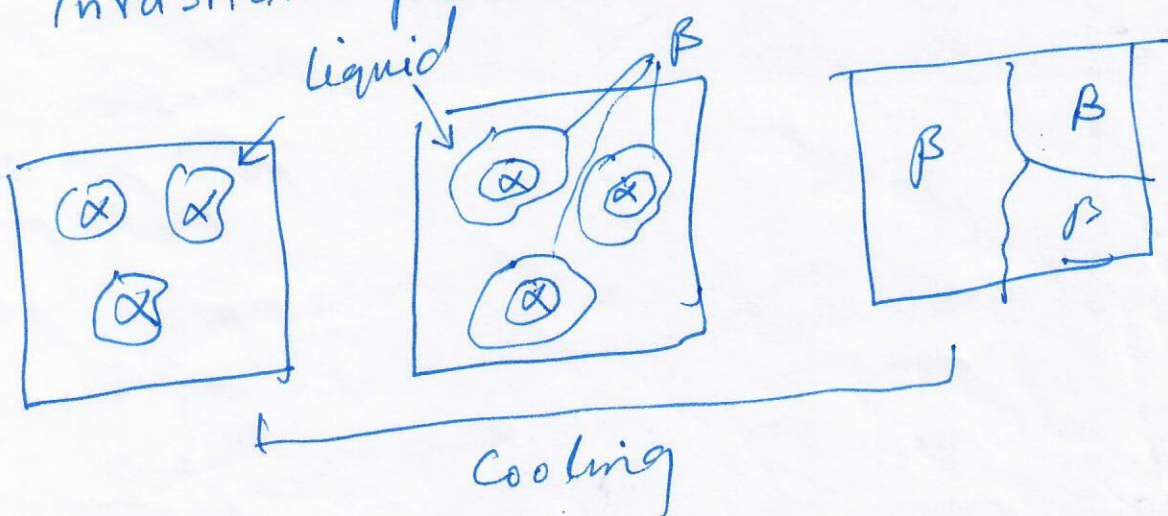


Binary Peritectic Alloy Systems

This type of solidification occurs when melting point of each element is quite different. In this reaction a liquid phase reacts with a solid phase to form a new and different solid phase;



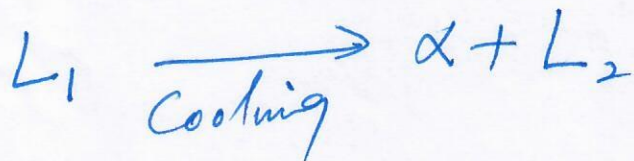
The silver platinum binary equilibrium phase diagram is an example that has invariant peritectic reaction.



some % age of platinum
entire




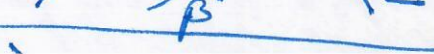
Binary Monotectic Systems

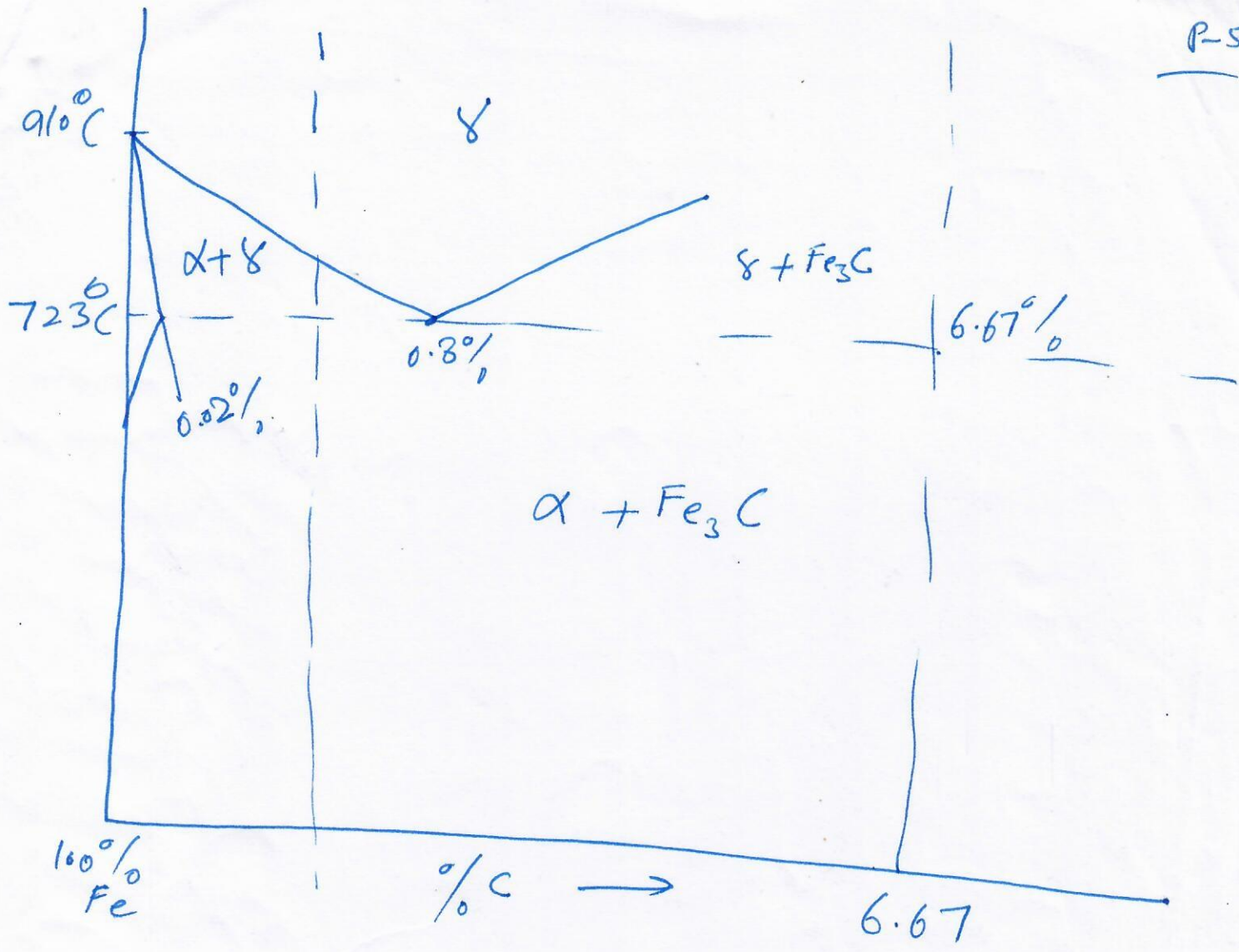
In a three-phase invariant reaction that occurs in some binary phase diagrams is the monotectic reaction in which a liquid phase transforms to a solid phase and another liquid phase as



In copper-lead at 955°C and 36% Pb, At 326°C and 99.94% Pb eutectic point occurs

Types of three Phase invariant reactions occurring in binary phase diagrams

Name of reaction	Equation	Phase Diagram Characteristic
EUTECTIC	$L \xrightarrow{\text{Cooling}} \alpha + \beta$	
EUTECTOID	$\alpha \xrightarrow{\text{Cooling}} \beta + \gamma$	
PERITECTIC	$\alpha + L \xrightarrow{\text{Cooling}} \beta$	
PERITECTOID	$\alpha + \beta \xrightarrow{\text{Cooling}} \gamma$	



Iron Carbon Diagram (Simple)