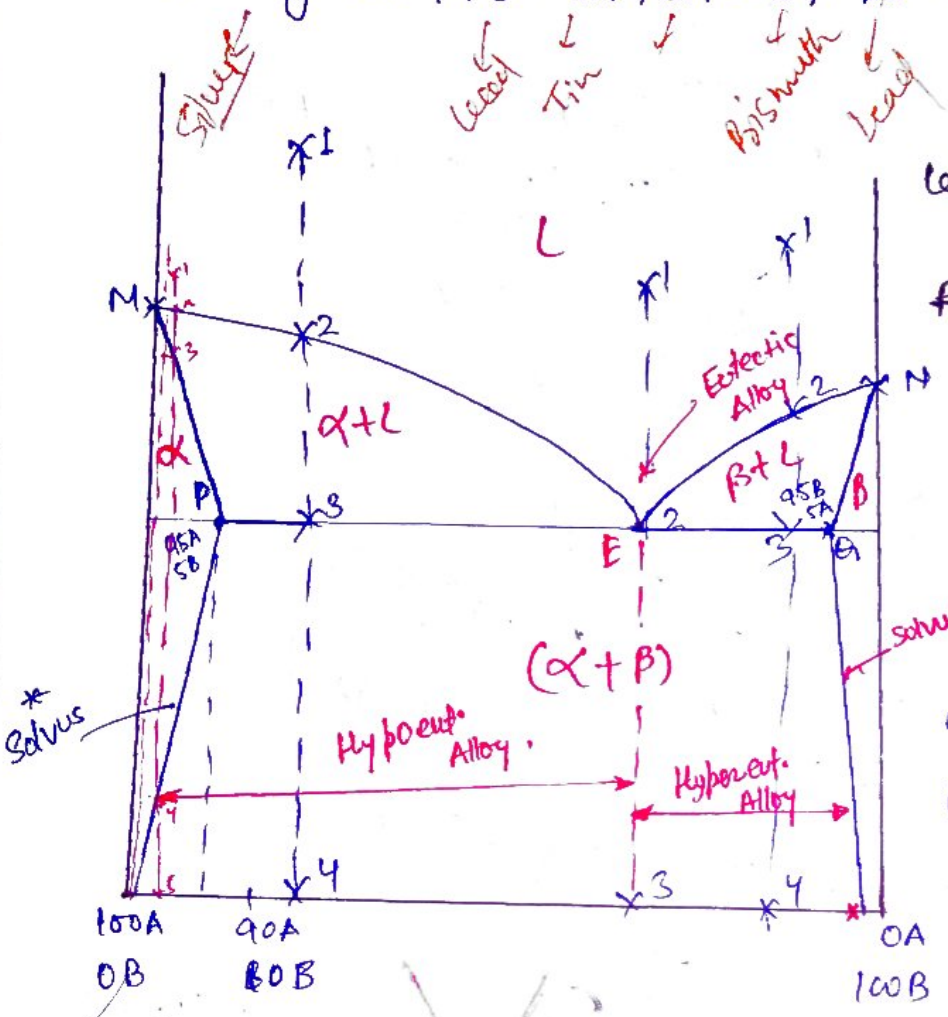
Type - III Partial eutectic system:

In this system of alloy the two system of alloys the two elements are added and partial solibility in solid state.

eg:- Ag-Cu, Pb-Sn, Sn-Bi, Bb-Sb ← Antimony.



let M = melting point of A

N = " " B

~~Eutt~~ Raoult's law -- valid

E = Eutectic

MEN = liquids

MPEQ,IN = solids

* minor B and major B

*

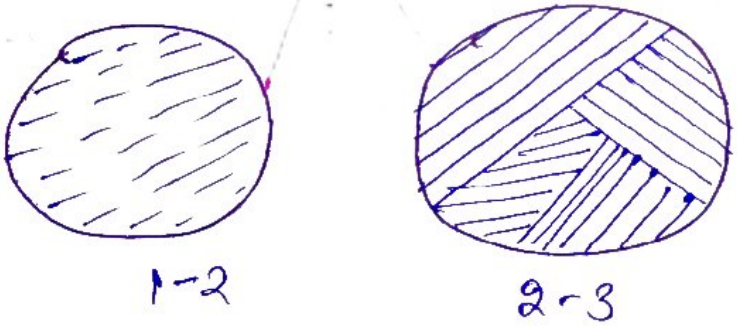
α = Solid soln of B in A.

β = Solid soln of A in B

Solubility ↑ → Temp ↑

* Solvus line indicate that ↓ in solubility by → Temp ↓

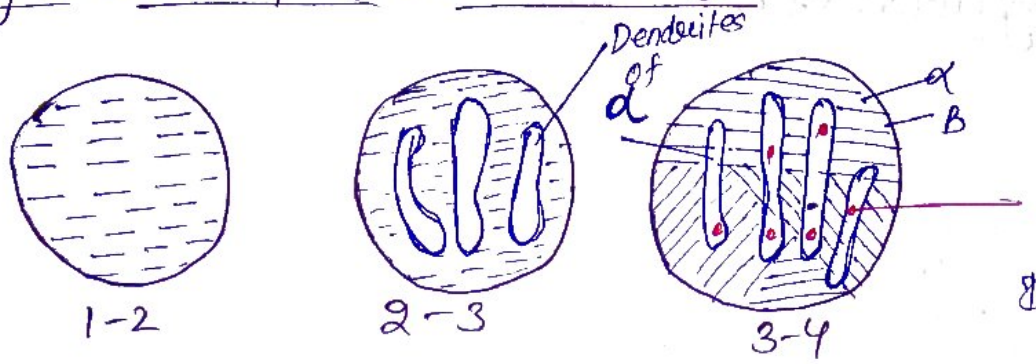
Cooling behaviour of Eutectic alloys:



1-2

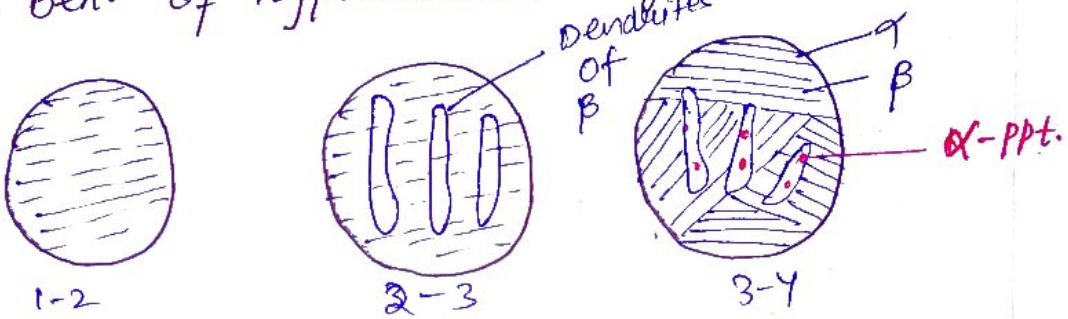
2-3

Cooling Behaviour of hypoeutectic Alloy:



Same to

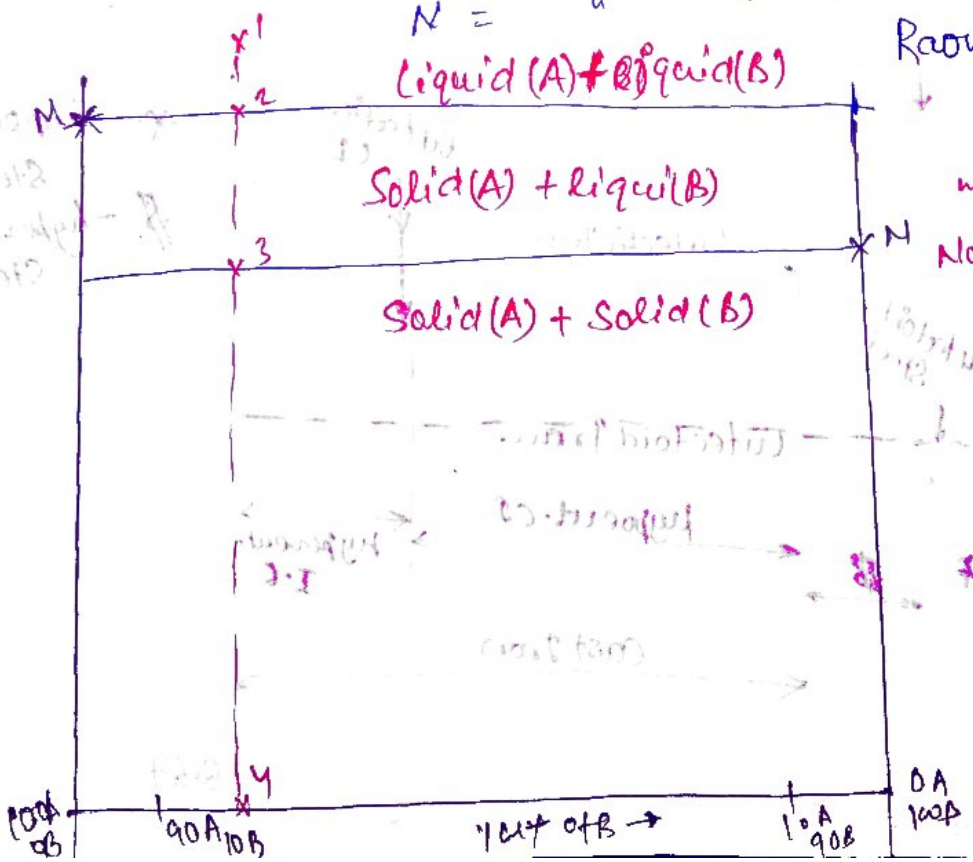
Cooling Beh. of hypereutectic alloys.



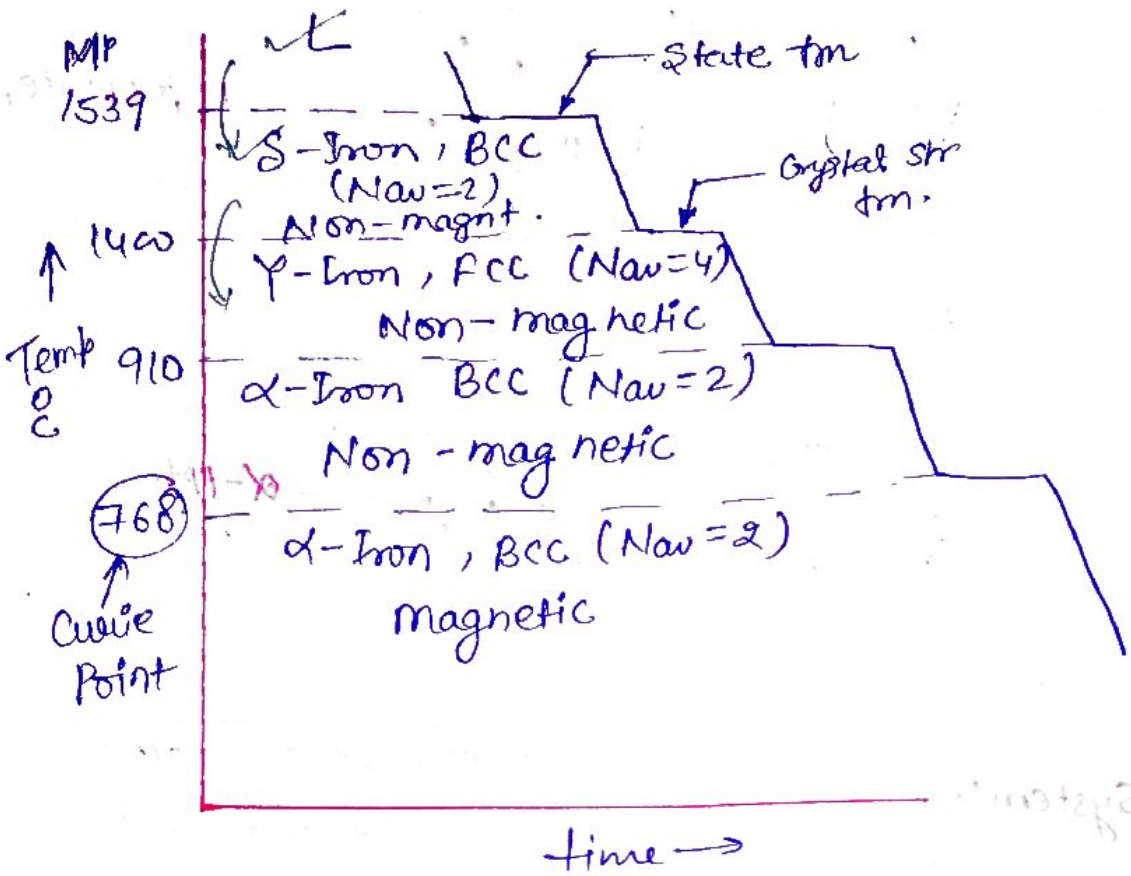
Type-IV layer System:- In this system 2 element are added will exhibit complete solibility in both liquid and solid state, eg - Cu-Mo, Cu-W, Ag-Fe, Ag-W.

M = melting point of element 'A'.
N = " " " " 'B'.

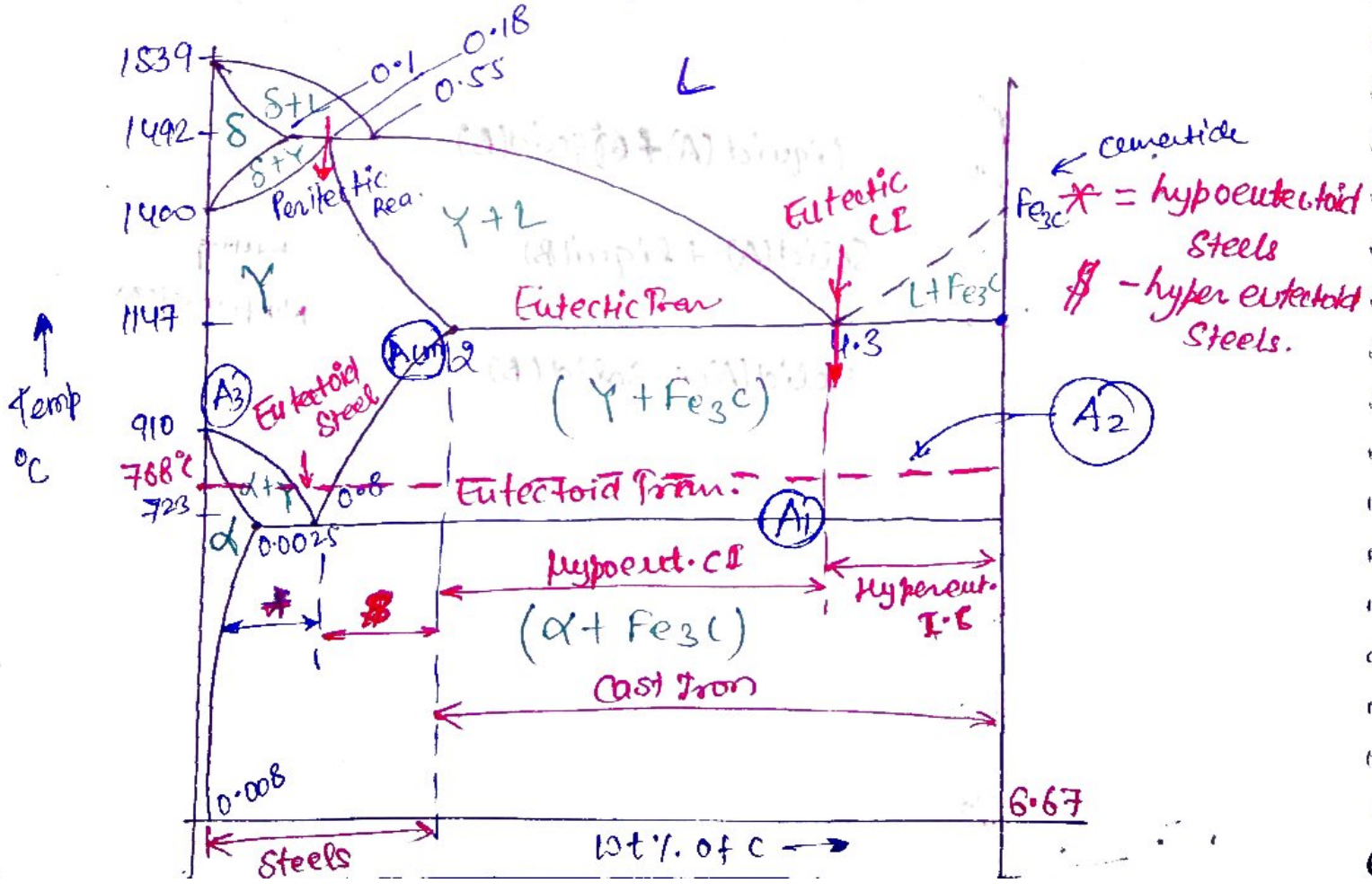
Raoult's law not valid.



Cooling curve of Pure Iron:-



Iron-Iron-carbide diagram:-



Defination of Important Phases :-

* δ - Ferrite
* γ - Austenite
* α - ferrite

] Interst solid sol^{n}

* Fe_3C → Cementite] compound.

" δ - Ferrite is defined as interst. solid sol^{n} of carbon-Iron phase which is pure form of Iron having a BCC structure of avg No. of atm is 2. and non-magnet in nature. "

" γ - Austenite is defined as interst. solid sol^{n} of carbon in γ iron which is pure form of Iron having a fcc structure with Nav = 4 and non-mag in nature. "

" α - Ferrite is defined as interst. solid sol^{n} of carbon in α-Iron which is pure form of Iron having a BCC structure of avg no. of atm is 2 and mag. in nature during heating up to curie temp (768°C). "

Invariant Reaction :-

(I) Peritectic Reaction : (1492°C ; 0.18% C)

$\delta + L \xrightarrow{-\Delta H} \gamma$

$S_1 + L \rightleftharpoons S_2$

(II) Eutectic Reaction (1147°C, 4.3% C)

$L \xrightarrow{-\Delta H} \gamma + Fe_3C$

$L \rightleftharpoons S_1 + S_3$

(III) ~~Eutectoid Reaction~~ Ledoburite is defined as eutectic mixture of Austenite and cementite.

(IV) Eutectoid Reaction (723°C ; 0.0025% C)

$\gamma \xrightarrow{-\Delta H} (\alpha + Fe_3C)$ → Pearlite.

$S_2 \rightleftharpoons S_4 + F_3$

Pearlite is defined as a eutectoide mixture of α-ferrite and cementite.

* Aust. is not metrologically stable below 723°C hence decomposes into α-ferrite and cementite.

Solubility of Carbon in various phases:-

* Carbon solubility in δ-ferrite is 0.1%.
* " " " Austenite is 2%.
* " " " α-ferrite " 0.025%
* " " " α-ferrite at room temp. is 0.008%.
* " " " cementite is 6.67%.

Some critical temp. line and their significant

* A_1 line is known as lower critical temp. line.
* This line indecate, the transformation of pearlite into Austenite upon heating of eutetoide steel.
* A_2 ~~line~~ is known as curie point temp. line it significe magnetic to Non-magnetic transformation in Iron-carbon ~~transf~~ system of alloy upon Heating.
  Carbon containt have effect on every point temp.
* A_3 is calleed as upper critical temp. line for hypoeut. temp. line. This line significe that transformation of ferrite into austenite upon heating of hypoeutetoid steel.

* Acm line is known as upper critical temp. line for hypereutectoide steel. This line signifie the transformation of cementide into austenite upon heating of hypereutectit steel.