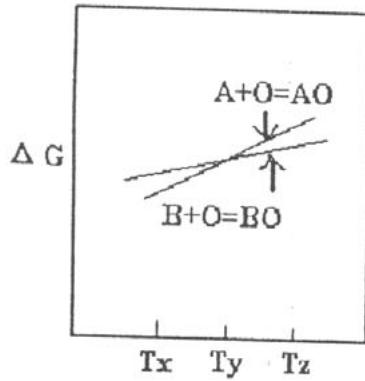
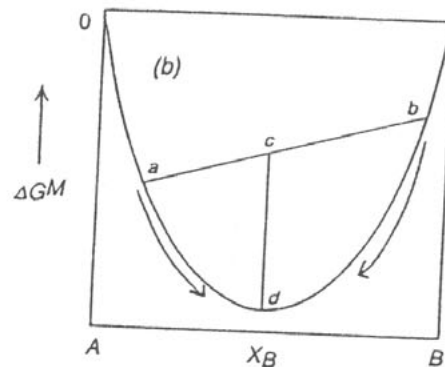
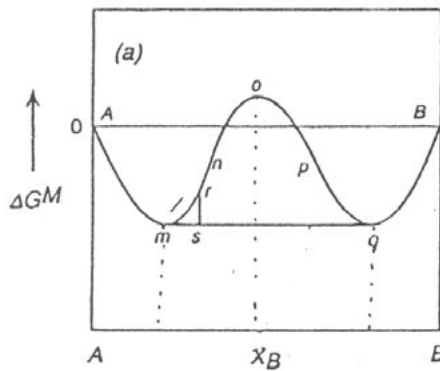


1. From the following Ellingham diagram for the oxidation of metals A and B, when enough A, AO, B, BO are mixed together in a closed chamber at (i) temperature= T_x and (ii) temperature= T_y what will happen to the mixture of A, AO, B, BO. Use the change in p_{O_2} to explain both answers in detail (10 points)



2. (1) Considering the deviation from the ideal solution, what type of solution will give the molar Gibbs free of mixing as shown in the following figure (a) when compared with an ideal solution shown in Figure (b) (Hint: use ΔG , ΔH , ΔS and T to explain your answer)
 (2) When the composition of solution moves from m to o, describe and explain the phase change occurring in this solution. (10 points)

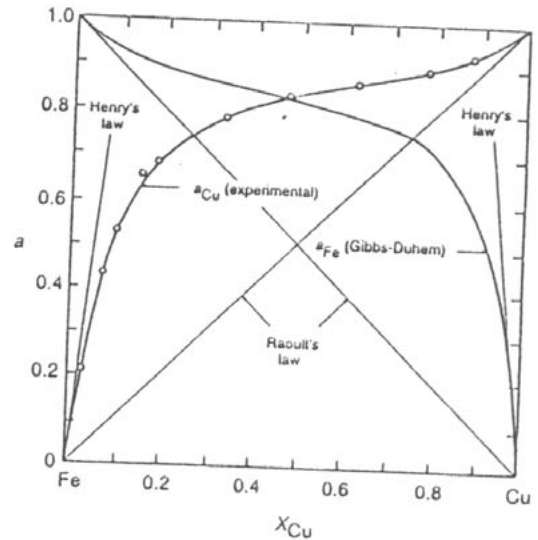


3. In a binary solution A-B which exhibits negative deviation characteristics from a ideal solution (1) Draw a schematic diagram of activities of A and B vs X_B , (2) when $X_B \rightarrow 0$, and $X_B \rightarrow 1$, Describe the behavior for component A and B. (10 points)

4. (1) What are the characteristics of an ideal solution A-B in terms of the thermodynamic properties of the solution (e.g. ΔG , ΔH , ΔS) (2) Similarly, describe the thermodynamic properties of a regular solution and describe the differences when compared with the ideal solution. (10 points)

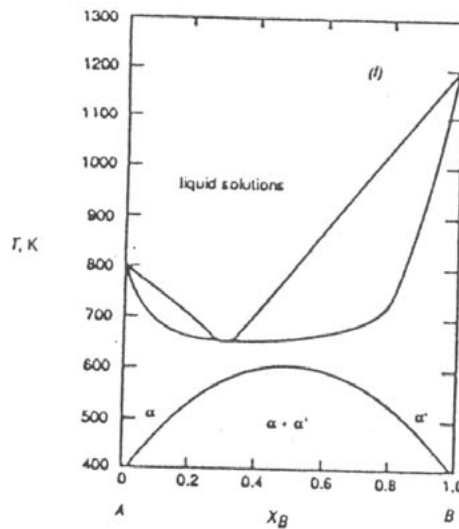
5. Determine and draw γ_{Cu} and γ_{Fe} vs X_{Cu} in Cu-Fe system, when their activities vs composition at 1550°C are shown in the following figure.

(10 points)



6. From the phase diagram shown. Please draw schematic Gibbs free energy of mixing curve at (a) 800K (b) 700K and (c) 500K

(10 points)



7. 請敘述熱力學第二定律的主要精神 [20 points]

8. 請舉例說明"可逆過程"(reversible process)的意義及其在熱力學中所扮演的角色 [20 points]