

Note: Attempt Five Questions

Q1: Use this data for a series of A-B alloys to produce the phase diagram

Temperature °C (T1)	750	740	700	625	500	300	250
Temperature °C (T2)	750	700	525	400	325	260	250
Concentration % B	0	10	30	50	75	90	100

For alloy which contain 40% B and weight of the alloy 200 grams answer the following questions

1. Start and completely solidification
2. Weight and concentration of phases at 400 °C

Q2: The diffusion coefficients for two elements are given in table below

$D * 10^{-3} (m^2/s)$	60	80	130	170	200
T (K)	527	627	727	827	927

- A. Determine the values of D_0 and the activation energy
- B. What is the magnitude of D at 227 °C

Q3: A carburizing is carried out on a 0.1%C steel by introducing 1.0%C at the surface at 977°C; calculate the carbon content at 0.01 cm, and 0.05cm, from the surface after 1hour? If you know that $D_0 = 0.23Cm^2/sec$, $Q = 37500 cal/mol$, $R = 2cal/mol$, and $erf(u) = u$.

Q4:

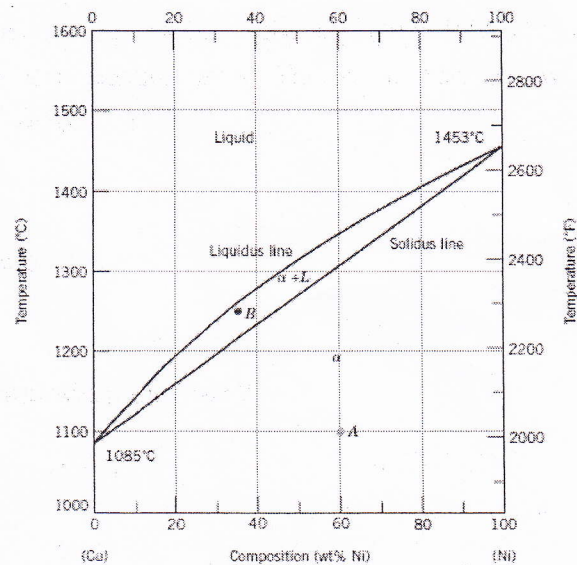
- A. Explain how can be produce malleable cast iron?
- B. List the type of cast iron according to the microstructure.

Q5:

- A. What are the properties of eutectic structure?
- B. What are the important points in iron –carbon equilibrium diagram?

Q6: A copper–nickel alloy of composition 70 wt% Ni–30 wt% Cu is slowly heated from a temperature of (1300 °C).

- A. At what temperature does the first liquid phase form?
- B. What is the composition of this liquid phase?
- C. At what temperature does complete melting of the alloy occur?
- D. What is the composition of the last solid remaining prior to complete melting?



Good luck