Quiz

1. What is diffusion?
2. What are the two necessary conditions for diffusion to occur?
3. What are the mechanisms of diffusion?
4. What is self-diffusion?
5. What is steady state diffusion? Describe Fick's first law of diffusion.
6. What is Fick's second law of diffusion?
7. What is the effect of temperature on diffusion? How is the activation energy obtained?
8. What other factors affect diffusion rate in metals?
9. Give an example of an industrial process which uses diffusion.
10. Calculate the diffusivity of carbon in γ-Fe at 927 °C. $D_o = 2 \times 10^{-5}$ m^2/s and $Q = 142$ kJ/mol
11. The diffusivity of Ag atoms in Ag metal is 1.0×10^{-17} m^2/s at 500 °C and 7.0×10^{-13} m^2/s at 1000 °C. Calculate the activation energy for diffusion of Ag atoms in the temperature range 500 – 1000 °C.
12. A plain carbon steel (0.18% C) is to be carburized at 927 °C. What is the time needed to make the carbon content 0.35% at a depth of 0.4 mm? Take C content at surface to be 1.15 wt%. D = 1.28×10^{-11} m^2/s.
13. If the same steel is carburized for 7 hrs at 927 °C what will be the carbon content at a depth of 1mm from the surface?