CHAPTER 4

**IMPERFECTIONS IN SOLIDS**

**4-2, 4-19, AND 4-35**

4.2 Calculate the number of vacancies per cubic meter in iron at 850°C. The energy for vacancy formation is 1.08 eV/atom. Furthermore, the density and atomic weight for Fe are 7.65 g/cm3 and 55.85 g/mol, respectively.

4.8 What is the composition, in weight percent, of an alloy that consists of 6 at% Pb and 94 at% Sn?

4.19 For a solid solution consisting of two elements (designated as 1 and 2), sometimes it is desirable to determine the number of atoms per cubic centimeter of one element in a solid solution, N1, given the concentration of that element specified in weight percent, C1. This computation is possible using the following expression:

  *(4.18)*

where

 NA = Avogadro’s number

 ρ1 and ρ2 = densities of the two elements

 A1 = the atomic weight of element 1

*Derive Equation 4.18 using Equation 4.2 and expressions contained in Section 4.4.*

4.35 Determine the ASTM grain size number if 25 grains per square inch are measured at a magnification of 600.