

**MAE 2321-001**  
**Spring 2008**  
**HOMEWORK #4**

Assigned Feb 12, 2008  
Due Feb 19, 2008

**Chapter 5**

When needed, use tables in your book for information  
such as atomic weight, density, etc.

1.
  - a. Calculate the fraction of atom sites which are vacant for Si at its melting temperature of 1410°C, and at 27°C. Assume an energy for vacancy formation of 4 eV/atom.
  - b. Calculate the number of vacancies per cubic centimeter of Si at 27°C.
  
2. Carbon C forms a solid solution with austenite (the high temperature FCC phase of Fe). The maximum C content is 2.14 weight%, at this composition calculate the atomic percent Fe and C.
  
3. White 18 carat gold can be made with 17.3 mole % nickel, 5.5 mole % zinc and 2.2 mole % copper (the rest is Au) and is silver in appearance.
  - a. Calculate the weight percent of each of the 4 elements in this composition of white gold.
  - b. Calculate the weight of Ni (in grams) in a pendant that weighs 7 grams.
  
4. Calculate the number of atoms per cubic centimeter of a) Cu and b) Au.

Book 5.9

Book 5.20

5. Calculate the density ( $\text{g/cm}^3$ ) of the composition in problem 3.

Book 5.28

Book 5.32