Problem M24

   Two metals of current and historical interest for aerospace applications, nickel and magnesium, have face centered cubic and close packed hexagonal structures respectively.

a) Assuming that the atoms can be represented as hard spheres, calculate the percentage of the volume occupied by atoms in each material.

b) Calculate, from first principles, the dimensions of the unit cell in nickel and in magnesium.
   (The densities of nickel and magnesium are 8.90 Mgm^{-3} and 1.74 Mgm^{-3} respectively, the atomic weight of Nickel is 58.69, Magnesium is 24.31, Avogadro's number is 6.023x10^{23}).