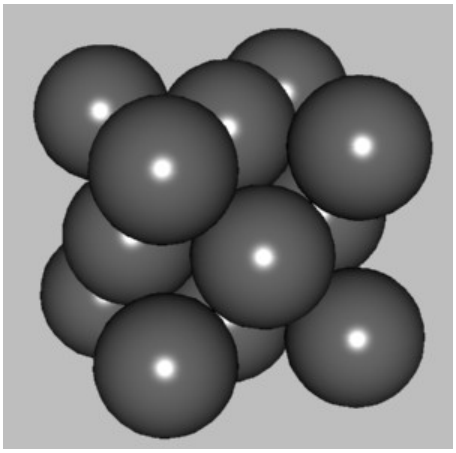
Exercice I

1) Calculate the packing efficiency of a face-centered cubic structure of atoms with a diameter of 1.00 Å (100 pm).



2) Copper has an atomic radius of 1.28 Å, an fcc crystal structure and an atomic weight of 63.5 g/mol. Calculate the theoretical density of Cu (measured value: 8.94 g/cm^3).

3) What is the formula of a compound that crystallizes with lithium ions occupying all of the tetrahedral holes in a cubic-closed packed array of sulfide ions ?

4) How many Cl^- ions surround a Na^+ ion and what is the geometric description of the coordination around the Na^+ ion? The ionic radii for Na^+ and Cl^- are 99 and 181 pm (1 pm = 10^{-12} m) respectively. What is the cation to anion radius ratio in this structure? In view of this ratio, do the neighboring chloride ions touch each other?

5) How many ions of each are contained in the face-centered unit cell of NaCl? The density of NaCl is 2.165 g/cm^3, what is the cell edge length of the unit cell.