Worksheet 10 and 11

1. Calcium metal crystallizes in a face centered cubic unit cell. The density of the solid is 1.54 g/cm3. What is the radius of calcium atom?
2. Calculate the density of vanadium if it crystallizes in body center cube and has an atomic radius of 262.2 pm.
3. Iron has a body-centered cubic unit cell with a cell dimension of 286.65 pm. The density of iron is 7.874 g/cm3. Use this information to calculate Avogadro's number.
4. Complete the following table.

Compound	Molality	Weight %	Mole Fraction
NaI	0.15		
C_2H_5OH		5.0	
$C_{12}H_{22}O_{11}$			0.15

5. Hydrochloric acid is sold as concentrated aqueous solution. If the molarity of commercial HCl is 12.0 and it density is 1.18 g/cm3, calculate:
    a. The molality of the solution
    b. The weight percentage of HCl in solution

$$\text{Molality} = \text{m} = \frac{\text{Moles of solute}}{\text{kg of solvent}}$$

$$\text{Weight \%} = \frac{\text{Mass of A}}{\text{Total Mass}} \times 100$$

$$\text{Mole Fraction of A} = \text{X}_\text{A} = \frac{\text{Moles of A}}{\text{Total Moles}}$$