GEOL3010 Mineral Densities Problem Set 6

a.-c.The pyroxene enstatite ($MgSiO_3$) occurs in three different polymorphs. Clinoenstatite is monoclinic with cell edges a = 9.605Å, b = 8.813Å, c = 5.166, β = 108.46º and Z = 8. Protoenstatite is orthorhombic with a = 9.251Å, b = 8.773Å, c = 5.337, and Z = 8. Orthoenstatite is orthorhombic with a = 18.216Å, b = 8.813Å, c = 5.179, and Z = 16. Calculate the density of each.

d. Orthoferrosilite ($FeSiO_3$) is isostructural with orthoenstatite, but has cell edges a = 18.418Å, b = 9.078Å, c = 5.237. Compute its ideal density.

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2. The garnet end-member pyrope $Mg_3Al_2Si_3O_{12}$ is cubic, has a density of 3.58 g/cm^3, and Z of 8. Calculate the cubic cell edge.

3. The common sulfide mineral pyrite (FeS_2) has a density of 5.02 g/cm^3 and a unit cell edge of 5.42Å. Calculate Z, the number of formula units per cell.