Due: **Thursday, 12-December-2002** at the beginning of the review session, so I can go over any questions at that point. I know it's not much time, but I wanted to be able to review *everything* at the review session.

1) Metallic barium has a body-centered cubic structure (all atoms at the lattice points) and a density of 3.51 g/cm$^3$. Assume the barium atoms to be spheres. The spheres in a body-centered array occupy 68.0% of the total space. Find the atomic radius of barium.

2) In an experiment, a sample of 6.75 L of nitrogen at 26.0$^\circ$C and 768 mm Hg is bubbled through liquid acetone, C$_3$H$_6$O. The gas plus vapor at its equilibrium vapor pressure leaves the liquid at the same temperature and pressure. If 6.650 g of acetone has evaporated, what is the vapor pressure of acetone at 26.0$^\circ$C?

3) How much heat is needed to vaporize 20.0 mL of liquid ethanol, C$_2$H$_5$OH, at 25.0$^\circ$C? The density of the liquid is 0.7893 g/mL. You may need to collect standard heats of formation from your textbook.

4) The total pressure over liquid acetic acid, CH$_3$COOH, at 71.3$^\circ$C is 146 mm Hg, and is composed of a mixture of monomers and dimers. (A dimer is a molecule formed by two simpler molecules coming together.) If the density of the vapor is 0.702 g/L, what is the mole fraction of the dimer in the vapor? The dimer has the structure:

![Dimer Structure](image)