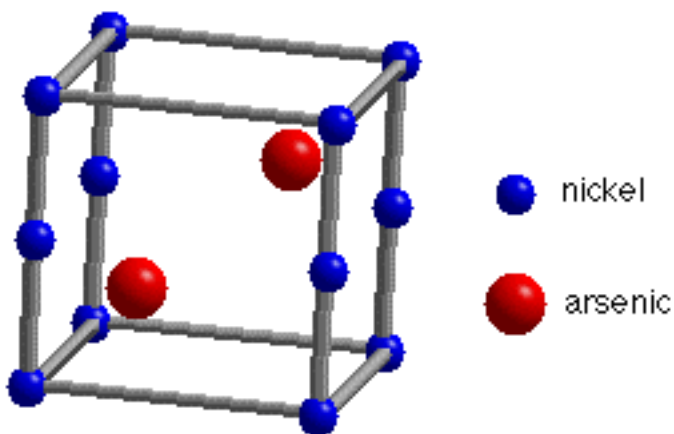


ALL work must be shown to receive full credit. **Due in lecture at 8:30 a.m. on Friday, February 14, 2002.**

PS4.1. Indicate the type of crystal (molecular, metallic, extended covalent, or ionic) each of the following would form upon solidification:

- | | |
|------------------------------------|-----------------------------|
| a) CS_2 ; | g) CsCl ; |
| b) $\text{C}_{(\text{diamond})}$; | h) H_2O_2 ; |
| c) Si ; | i) HCN ; |
| d) Na_2SO_4 ; | j) Pb ; |
| e) Fe ; | k) SF_6 ; |
| f) Br_2 ; | l) CaCO_3 . |

PS4.2. A cell of nickel arsenide is shown below. If this cell contains the unit cell for this compound, determine the correct formula for nickel arsenide. (NOTE: The arsenic atoms are completely inside the unit cell.)



PS4.3. Perovskite is a mineral containing calcium, titanium and oxygen. Two different cells are shown below. Support or refute whether or not the two structures contain the same number of atoms?

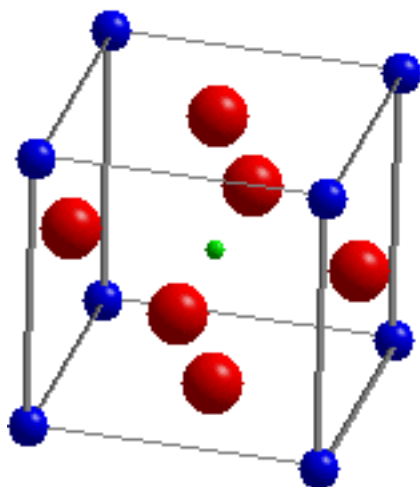


Figure I.

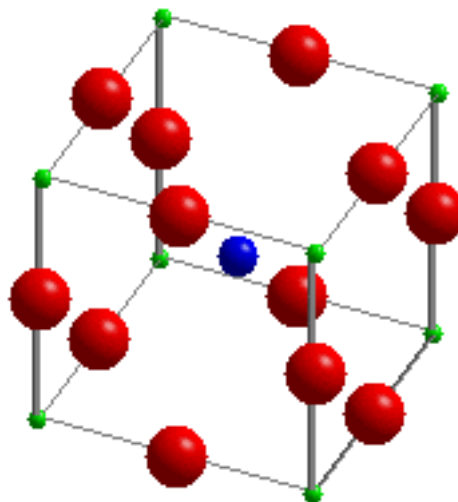
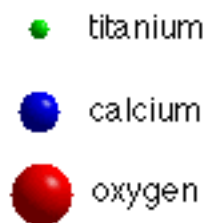


Figure II.

Explanation:

PS4.4. A particular solid has a structure in which W atoms are located at cube corners, O atoms at the centers of the cube edges, and Na atoms at cube centers. The cube edge is 3.86 \AA .

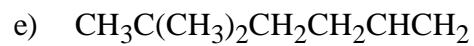
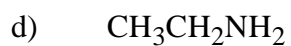
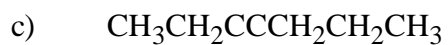
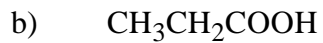
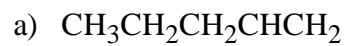
a) What is the formula of this material? (Show some work.)

b) What is its theoretical density?

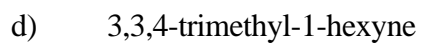
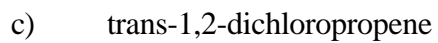
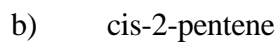
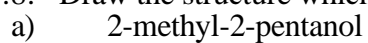
PS4.5. Iridium metal crystallizes in a body-centered cubic unit cell. The atomic radius of an iridium atom is 1.33×10^{-10} m. Calculate the density of iridium.

PS4.6. Chromium metal crystallizes in a face-centered cubic unit cell. The density of chromium is $7.19 \frac{\text{g}}{\text{cm}^3}$. Calculate the edge length of the unit cell and the atomic radius of chromium.

PS4.7. Draw the Lewis structure and name the following compounds;



PS4.8. Draw the structure which corresponds with each of the following names.



PS4.9. Draw the structural formula (Lewis structure) for five compounds with the formula C_3H_6O . Identify the name of each oxygen containing functional group used in each formula. Be sure you have at least three different functional groups in your five compounds.

PS4.10. Urea has the formula $(NH_2)_2CO$. Draw a Lewis structure for urea. Draw several molecules of urea and show (clearly label) at least two ways it can hydrogen bond in the liquid phase.