1. Metals that are very malleable (can be beaten or rolled into sheets) and ductile (can be drawn into wire) have the ccp structure. Why are these characteristics favored for ccp rather than hcp?

2. Why are layered structures such as those of CdCl$_2$ and CdI$_2$ usually not encountered for metal fluorides or compounds of the most active metals?

3. If Ge is added to GaAs, the Ge is about equally distributed between Ga and As sites. Which sites would Ge prefer if Se is added also? Would GaAs doped with Se be an $n$-type or a $p$-type semiconductor?
4. Sketch the curves for the distribution of energy states and their electron populations for a metallic conductor, an insulator, and a semiconductor.

5. Sketch the perovskite structures. Describe the coordination geometry for the cationic species for the structure, and give two examples of compounds that fall into this category.

6. (a) Explain how you might determine whether graphite forms intercalation compounds (GIC's) when placed in contact with various vapors such as SnCl₄, SOCl₂, HNO₃, CF₃COOH, etc. (b) If no reaction is found to occur, propose a different route to a possible compound. (c) What type of reaction, if any, do you expect?
7. Summarize the features of the BCS theory regarding superconductivity. Include definition of $\lambda$ and $\xi$, the London penetration depth and coherence length, respectively. Propose a synthetic route to obtain stoichiometric ErBa$_2$Cu$_3$O$_7$. 