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Submit to Justin by October 7 in class and remember that he likes short answers.

1. Write out the complete electronic configuration for the following species:

   (a) N, Si, Ga

   (b) N^{+3} (as in NF_3), Si^{+4} (as in SiO_2), Ga^{+3} (as in GaN)

2. For the transition metals (from Ti through Cu, from Y through Ag and La through Au) the electronic configurations are a little more difficult to write out. Firstly we use a shorthand notation: For Ti, for example, we write [Ar]$4s^2 3d^2$ where [Ar] refers to Ar — that takes care of everything earlier than K. Similarly, for Y, we would write [Kr]$5s^2 4d^1$. We then use the rule that s electrons are removed first, and that s^0, d^5 and d^{10} are stable — we should form these when we have the choice. For example, Cu is [Ar]$4s^1 3d^{10}$, Cu^{1+} is [Ar]$4s^0 3d^{10}$ but Cu^{2+} is [Ar]$4s^0 3d^9$. Write the electronic configurations (in the shorthand notation) for:

   (a) Ag, Ag^+, Au, Au^{3+}

   (b) Co^{3+}, Fe^{3+}, Zn^{2+}

3. How many electrons must be **removed** from Si so that it has the electronic configuration of the nearest noble gas (and which gas). How many electrons must be **added** to Si so that it has the electronic configuration of the nearest noble gas (and which gas). What does this tell us about the nature of Si ? What do you expect the configuration of Si to be in SiO_2 (sand) and in the hypothetical compound Na_4Si.

4. Use the periodic table and the electronegativity periodic table (given in Callister) to guess the nature of bonding in the following:

   (a) GaN, GaP, GaAs, GaSb (is there a trend ?)

   (b) CsAu, MnBi, LiAlSi (this last one is a bit tricky !)

5. Atoms and ions in solids are held together by some attractive force. In the absence of any sort of attraction, can a gas be turned into a crystalline solid ? How ?