Physics 556 Spring 2007
Homework # 2, due Monday Feb. 12

1. Compare the C_2 molecule with our naïve picture of N_2 and O_2. What can you say along the same lines about C_2? There is probably some experimental literature. I am curious what the dissociation energy and vibrational frequency are. Often molecules like this (which chemists refer to as "unstable" because you can't bottle them) are interesting to astronomers because they occur in space.

2. Use similar naïve arguments to discuss KF. You may assume that K is an argon closed shell plus an outer s electron. You don't need to worry about the closed shell, just that outer electron.

3. Use similar naïve arguments to discuss TiC. You may assume Ti is an argon closed shell plus 4 outer electrons which occupy s and d orbitals (neglect valence p orbitals.) Remember that there are various azimuthal quantum numbers m. For d levels, please show that m= ±1 orbitals can be "rotated" to a new representation xz and yz, where z is the molecular symmetry axis, and that $m=0$ and $m=\pm2$ orbitals can also be rotated to convenient real second order polynomials (what are they?)