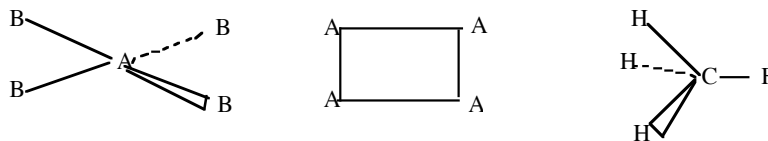


HOMEWORK ASSIGNMENT # 6
DUE: FRIDAY 6 MARCH

1. Determine the symmetry elements and the appropriate point groups for the following molecules. The dashes refer to chemical bonds going into the paper, the triangles to bonds going out of the paper, and the regular lines to bonds in the plane of the paper. All equivalent bond lengths are equal. The second molecule is supposed to be square. The 3 F-C-H bond angles in the third molecule are equal.



2. Write out the multiplication table for the group C_{3v} . This is easiest to do in this particular case by picking a molecule of the appropriate symmetry and determining what the assorted symmetry elements do to the molecule; e.g. $C_3(H_a H_b H_c) = H_c H_a H_b$; $\sigma_a(H_a H_b H_c) = H_a H_c H_b$. Then, determine the classes of the symmetry elements and write out the character table using the theorems on representations discussed in class. Note that the number of elements in a class acts as a degeneracy in the orthogonality relation. You can of course check your answer with that in your text.

3. For a molecule with point group C_{3v} and a ground electronic state of 1A_1 symmetry, determine the symmetries of excited electronic states that can be reached via dipole selection rules from the ground state. Character tables can be found in your text.