

Symmetry of Molecules and Group Theory (Hagiwara)

Problem Set #6 (For Chapter 7&8) 2019/12/11

1. Describe the four hybridized orbitals, h_1 to h_4 of the d -block transition metal atom in the square planer environment by a linear combination of the atomic orbitals of it. Describe the four symmetry functions for the ligand to be adapted for the four hybridization orbitals.
2. Rhenium heptafluoride possesses D_{5h} symmetry (pentagonal bipyramid) in gas phase. Heptafluorotungstate anion (WF_7^-) possesses C_{3v} symmetry (monocapped trigonal antiprism, one of the face of a trigonal antiprism has an apex to form a triangle pyramid) in CsWF_7 crystal. With s , p and d orbitals available on rhenium and tungsten atoms, respectively, what hybridization schemes are possible for σ bonds for each atom?