Quiz 10.1 – Molecular Shapes and Symmetry Groups

Name: Key

Symmetry Operations

List and briefly describe all symmetry operations

C_n - rotations around an axis

σ - reflection across a plane

S_n - improper rotation ($C_n * \sigma_h$)

E - identity (do nothing)

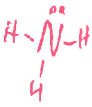
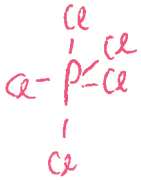
i - inversion through a point

The inversion operator, i, can be represented by combinations of other operators. For example, three consecutive reflections $\sigma_x\sigma_y\sigma_z$ would accomplish the same transformation as i. There is also one *single* operator which is equivalent to i. What is this single operator?

S_2 is the same as i

Symmetry Groups

Assign each molecule or ion to a symmety point group

- CO_2 $D_{\infty h}$
- CH_4 T_d
-  NO_3^- D_{3h}
-  NH_3 C_{3V}
-  PCl_5 D_{3h}
-  SF_4 C_{2V}
- SF_6 O_h
-  ClF_5 C_{4V}
-  XeF_4 D_{4h}
- C_2H_6 (staggered conformation) D_{3d}
- CH_2CCH_2 D_{2d}
- $C_{10}H_8$ (naphthalene) D_{2h}