This Class

4.1 Symmetry elements and Operations

Next Class

4.2 Point Groups

Why care?

Molecular spectroscopy depends on symmetry (IR & Raman)

MO Theory ... orbitals have to have appropriate symmetry to interact.

the movement we are referring to

element is the object about which

we do the operation

view before performing the operation

is indistinguishable from the

view after then we found a

symmetry operation of the molecule

E do nothing to the molecule (multiply by 1) and it will look the same

C_n $n = \frac{360}{angle}$ or $\frac{2\pi}{angle}$

180° rotation $n = \frac{360}{180} = 2$ is a C_2

The element is an axis or line

Reflect parts of a molecule in a mirror

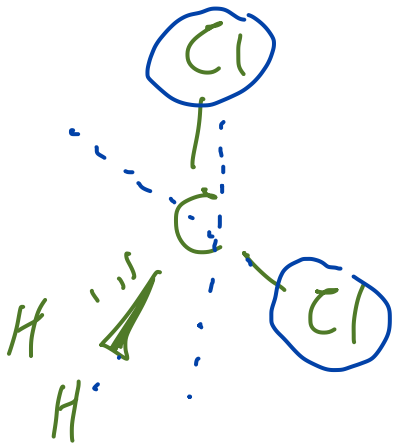
or the element is a plane

h = horizontal
v = vertical
d = dihedral

} these names are based on the relationship of the plane to the principle axis

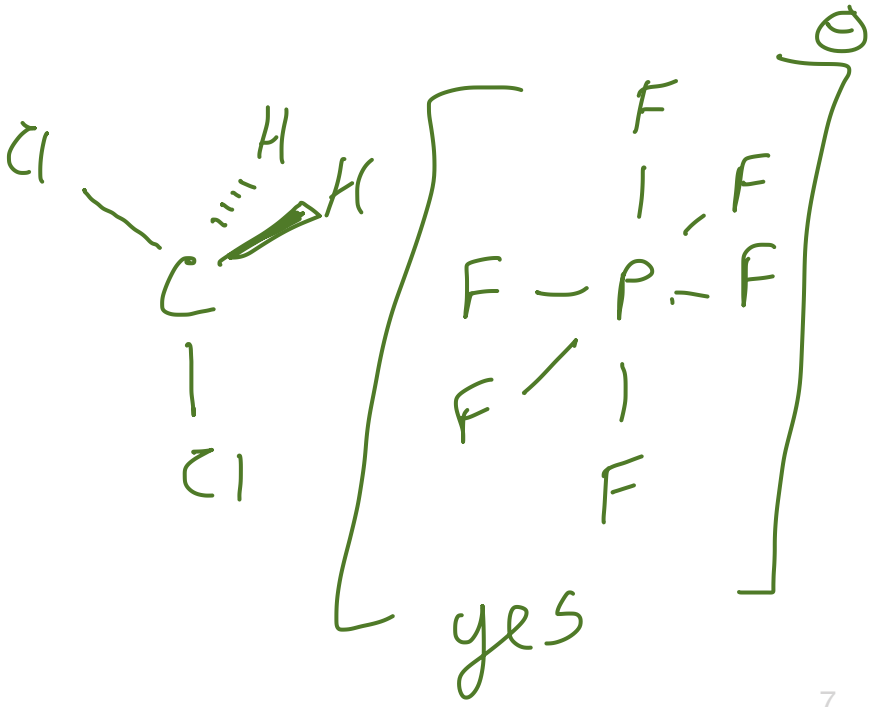
Every atom moves through the center and comes out the other side at the same distance

i the element is a point



i

NO

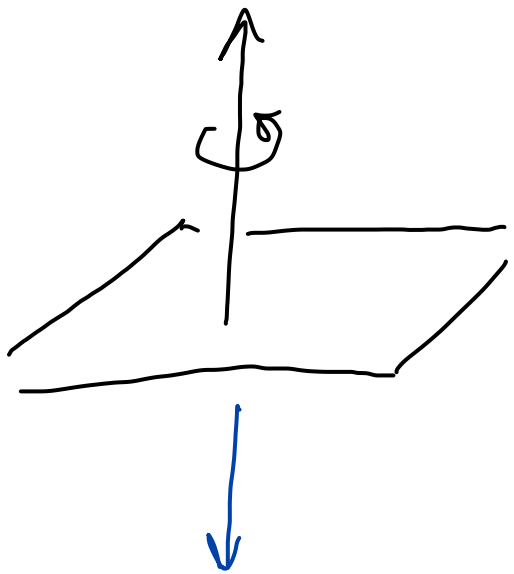


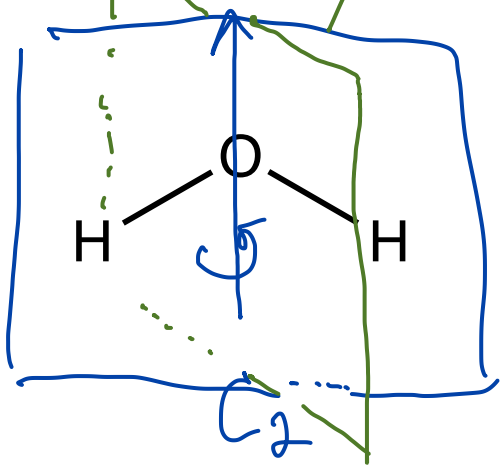
yes

S_n $\quad n = \frac{360}{\text{angle}}$ or $\frac{2\pi}{\text{angle}}$

rotate on an axis by $360/n$ °

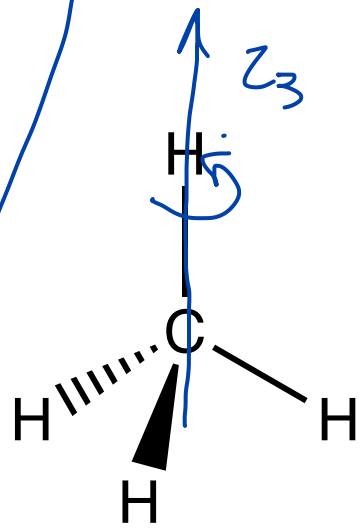
then reflect on the plane ⊥ to the axis of rotation



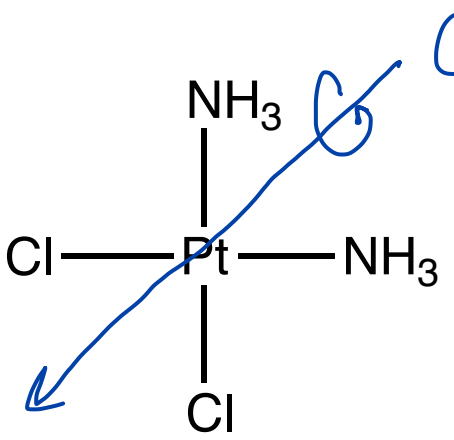


plane ⊥ to screen reflects left H to right position and vice versa

atoms all contained in the plane of the screen. If the screen is a mirror, the back halves would be reflected to the front halves



planar so σ



another mirror plan that is ⊥ to screen + bisects N-Pt-N angle

4 C_3 axis, 1 through each C-H bond 4 σ + more!