

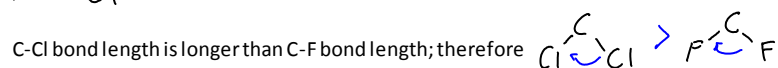
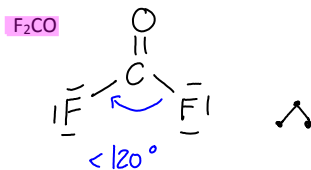
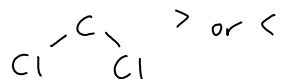
Wednesday, January 16, 2008  
10:04 AM



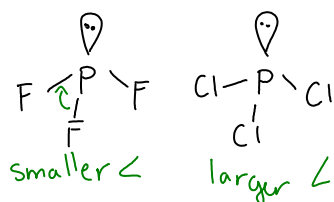
Notes 0116

Audio recording started: 10:05 AM Wednesday, January 16, 2008

- $\text{N}_3^-$

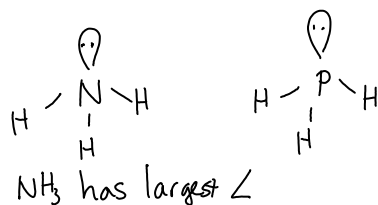


- $\text{PF}_3, \text{PCl}_3, \text{PBr}_3, \text{PI}_3$



- $\text{NH}_3, \text{PH}_3, \text{AsH}_3, \text{SbH}_3$

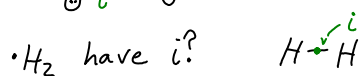
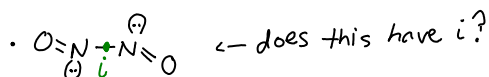
Which has largest angle?



# Symmetry of molecules

## Symmetry operations:

1. **E**: does nothing, but every molecule has it.
2. **i**: Inversion center -



Two positions, you can't tell them apart, they aren't the same, but they are equivalent.

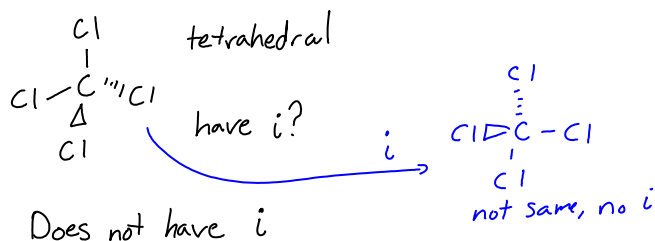
Linear algebra:  $(x, y, z), i(-x, -y, -z)$

## 3. Rotation axis

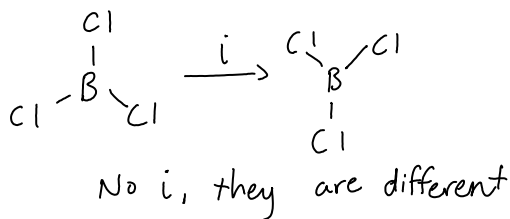
- ☐  $C_n$  degree of rotation =  $360/n$
- ☐  $C_3$  degree of rotation =  $360/3 = 120^\circ$
- ☐  $C_2 = 180^\circ, C_1 = E$

## Inversion center

- $CCl_4$

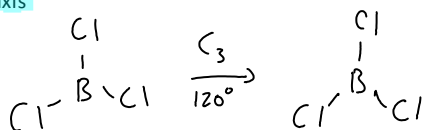


- $BCl_3$

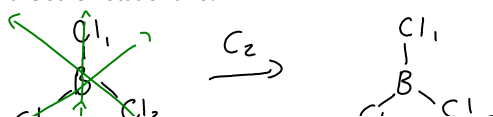


## Rotation axis

- $BCl_3$



Does  $BCl_3$  have other rotation axis?





has 3  $C_s$

$C_3, 3C_2$  ← rotation axis

$\hat{C}_3$  principle rotation axis (largest  $n$ )