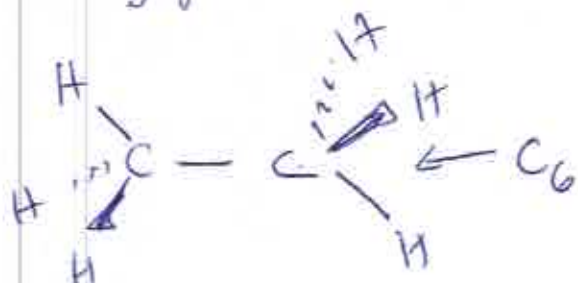
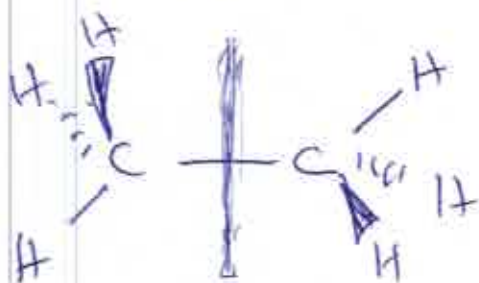


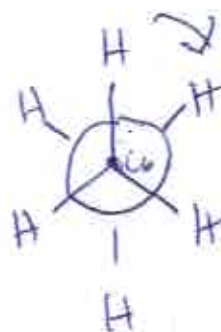
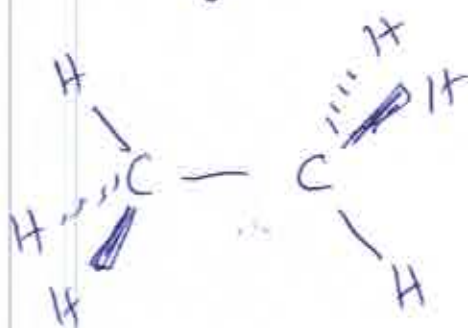
Staggered ethane



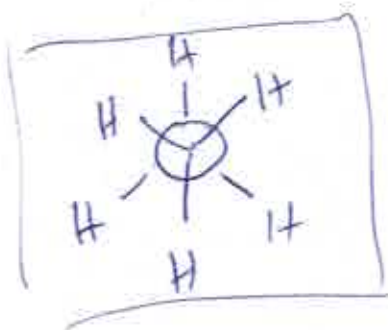
$\downarrow C_6$ (rotate by 60°)



$\downarrow \sigma_h$

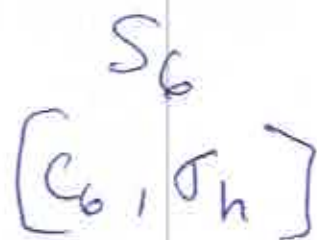


$\downarrow C_6$

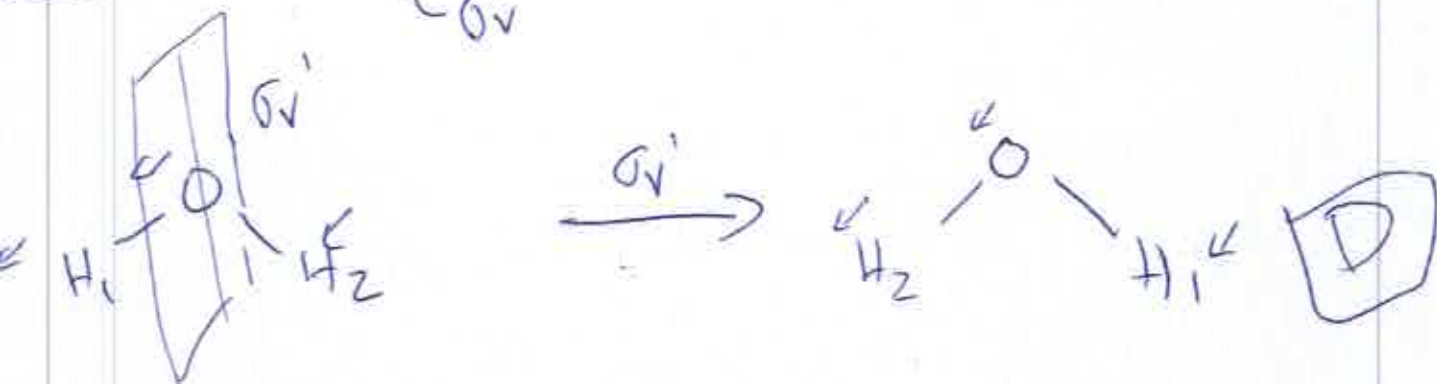
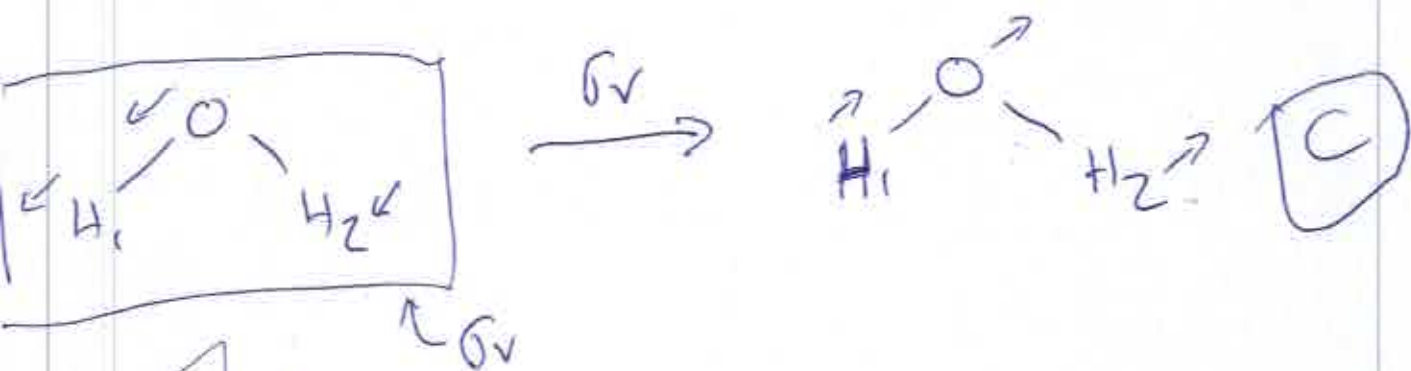
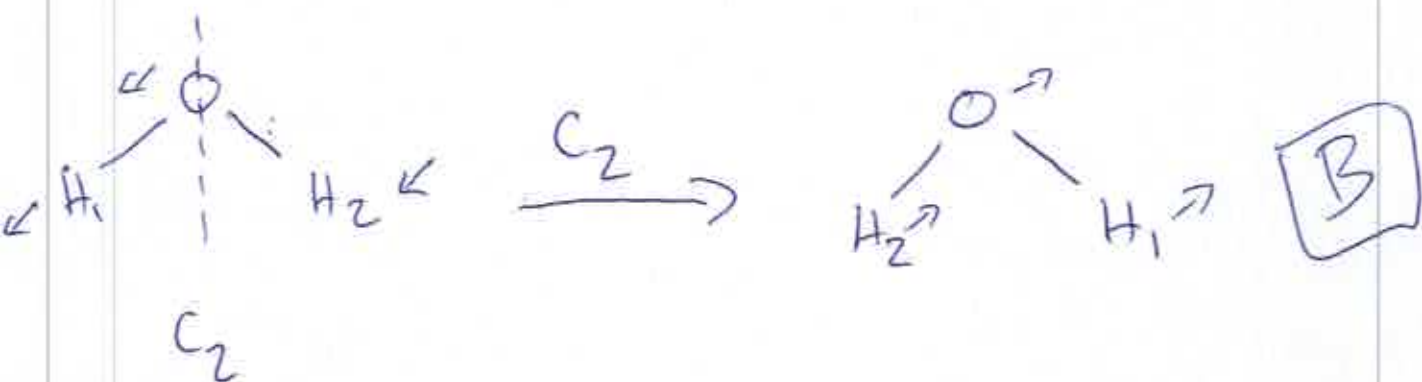


$\leftarrow \sigma_h$ in plane of page

$\downarrow \sigma_h$



Symmetry operations in H_2O

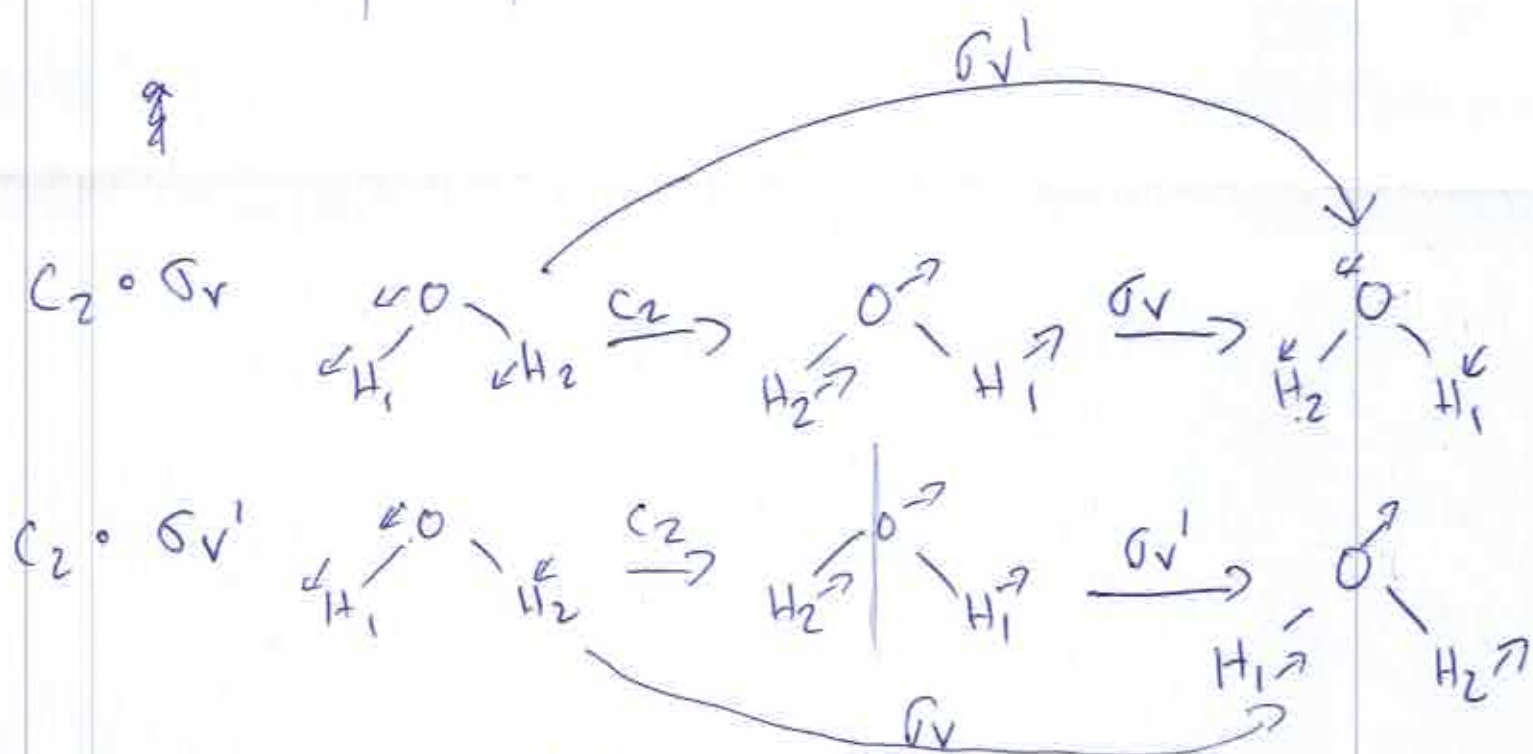


$E, C_2, \sigma_v, \sigma_{v'} \rightarrow C_{2v}$ point group

	E	C_2	σ_v	σ_v'
E	E	C_2	σ_v	σ_v'
C_2	C_2	E	σ_v'	σ_v
σ_v	σ_v		E	
σ_v'	σ_v'			E

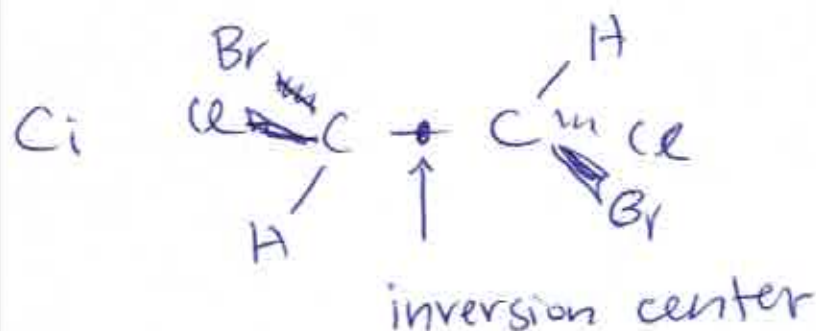
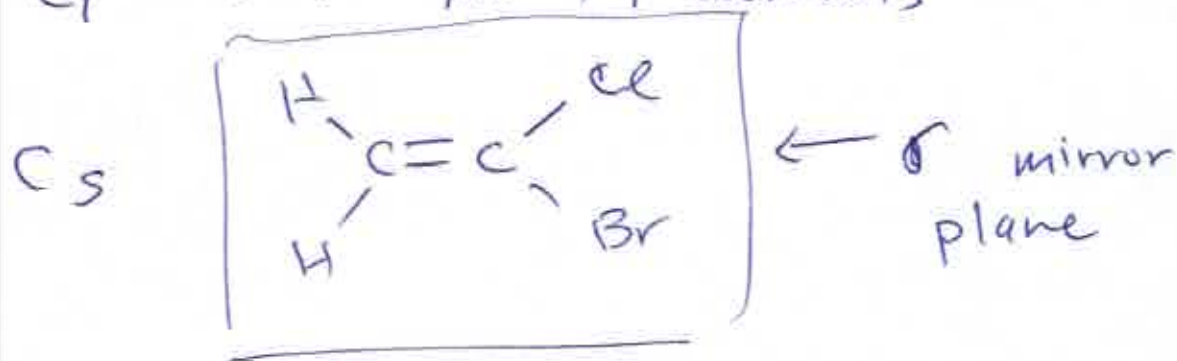
$E^2 = E$
 $C_2^2 = E$
 $\sigma_v^2 = E$
 $\sigma_v'^2 = E$

In this group, every operation is its own inverse



- 1) All products of two operations in a point group equal an operation in that point group
- 2) In your multiplication table, every row and column will be made up of each of the individual operation
↑ and all

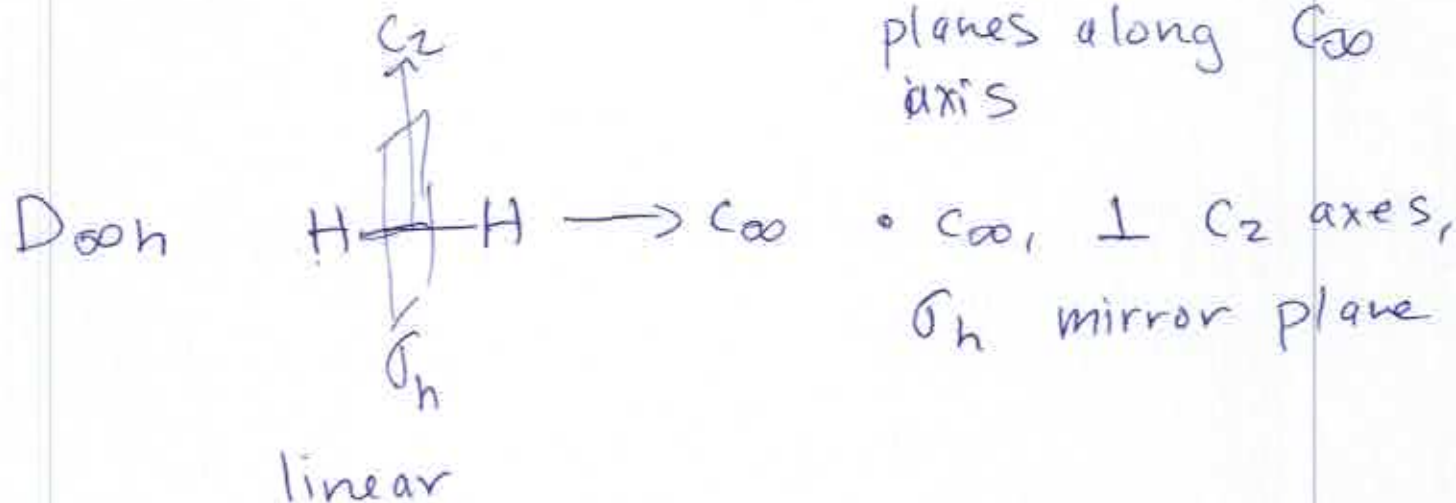
$C_1 \rightarrow$ no symmetry elements



$C_{\infty v}$ $H-Cl \rightarrow C_{\infty}$ • rotate around axis by any angle, get the same conformation

linear, ~~for~~

• infinite # of mirror planes along C_{∞} axis



$I_h \rightarrow$ soccer ball has this point group

$\rightarrow$ generally we won't focus on this point group