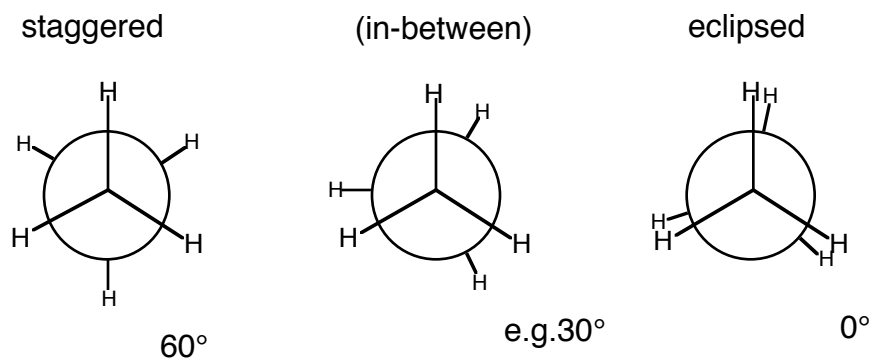


CEM 851 Handout 2
Symmetries of Organic Molecules

The D_n groups often cause confusion in symmetry analysis. Here is a brief example using ethane bond rotation to illustrate the D_3 system:

Consider Ethane:



Point Group:	D_{3d}	D_3	D_{3h}	
Symmetry	C_3	C_3	C_3	These two
Elements	$3C_2$	$3C_2$	$3C_2$	make it " D_3 "
	$3\sigma_d$		$3\sigma_v$	
	i		σ_h	

The σ_d mirror planes in staggered ethane are between the $3C_2$ axes, while the σ_v mirror planes in eclipsed ethane contain the $3C_2$ axes. It is especially helpful to build a model to see the C_2 axes in staggered ethane; they are perpendicular to the σ_d mirror planes.