

Shapes of Molecules

“Things” on central atom ¹							
Bonds	Lone Pairs	AX_mE_n ²	Shape	Bond angles	“Usual” Polarity ³	Hybridization	Appearance
2	0	AX_2	linear	180°	nonpolar	sp	$X-A-X$
3	0	AX_3	trigonal planar	120°	nonpolar	sp^2	
2	1	AX_2E	bent, nonlinear	$<120^\circ$	polar	sp^2	
4	0	AX_4	tetrahedral	109.5°	nonpolar	sp^3	
3	1	AX_3E	trigonal pyramidal	$<109.5^\circ$	polar	sp^3	
2	2	AX_2E_2	bent, nonlinear	$<109.5^\circ$	polar	sp^3	
5	0	AX_5	trigonal bipyramidal	120° eq 90° ax	nonpolar	sp^3d	
4	1	AX_4E	unsymmetrical tetrahedron, seesaw	$<120^\circ$ eq $<90^\circ$ ax	polar	sp^3d	
3	2	AX_3E_2	T-shaped	90°	polar	sp^3d	
2	3	AX_2E_3	linear	180°	nonpolar	sp^3d	
6	0	AX_6	octahedral	90°	nonpolar	sp^3d^2	
5	1	AX_5E	square pyramidal	$<90^\circ$	polar	sp^3d^2	
4	2	AX_4E_2	square planar	90°	nonpolar	sp^3d^2	

¹ “Things” include bonds and lone pairs. Remember, a multiple bond counts as one “thing”!

² X = surrounding atom; E = lone pairs

³ This is the polarity when all of the atoms connected to the central atom are identical (AX_m). If more than one type of atom is connected to the central atom, you will have to look at the overall shape of the molecule and the relative polarity of each bond to determine the polarity.