

Molecular Geometry

Van Koppes/Offen

Formal Charge (FC)	# of bonded atoms	# of lone pairs	Geometry	Bond Angle (°)	Hybridization	Example	Hybridization
0	2	0	Linear	180	sp	CO_2 $BeCl_2$	sp
0	3	0	Trigonal Planar	120	sp^2	BF_3 SO_3	sp^2
0	3	1	Trigonal Planar	120	sp^2	NO_2	sp^2
0	4	0	Tetrahedral	109.5	sp^3	CH_4 CCl_4	sp^3
0	4	1	Trigonal Bipyramidal	90, 120	sp^3d	PCl_5	sp^3d
0	5	0	Trigonal Bipyramidal	90, 120	sp^3d	PF_5	sp^3d
0	5	1	Trigonal Bipyramidal	90, 120	sp^3d	ClF_3	sp^3d
0	6	0	Octahedral	90	sp^3d^2	SF_6	sp^3d^2
0	6	1	Octahedral	90	sp^3d^2	BrF_5	sp^3d^2
0	6	2	Octahedral	90	sp^3d^2	IF_6^+	sp^3d^2
0	7	0	Pentagonal Bipyramidal	90, 120	sp^3d^2	IF_7	sp^3d^2

Example: Draw Lewis Structure, Molecular Geometry, Hybridization, Bond Angles, and Hybridization.

ClF₃ (ClF₃ has 2 lone pairs on the chlorine atom, and two lone pairs on the fluorine atoms) (ClF₃ has different number of electron pairs surrounding central atom)

ClF₃ If two lone pairs of electron/atoms, they have two sp³ hybrid orbitals. The number of orbitals is determined by the sp³ hybridization, and it can form a central atom/bonded to three lone pairs/sp³ hybrid orbitals. The other number of orbitals represents number of electron/atoms/bonded.

How else does it hybridize? (ClF₃ has 2 lone pairs on the chlorine atom, and two lone pairs on the fluorine atoms) (ClF₃ has different number of electron pairs surrounding central atom)