

## Molecular Geometry

## Van Koppes/Offin

Central Atom, AX <sub>n</sub> E <sub>m</sub>	# of bonded atoms	# of lone pairs	Electron Geometry	Bond Angle(s)	Molecular Geometry	Example	Hybridization
AX	1	0	Linear	180°	Linear	HCl	sp
AX <sub>2</sub>	2	0	Linear	180°	Linear	CO <sub>2</sub>	sp
AX <sub>2</sub> E	2	1	Trigonal Planar	120°	Bent	SO <sub>2</sub>	sp <sup>2</sup>
AX <sub>3</sub>	3	0	Trigonal Planar	120°	Trigonal Planar	BF <sub>3</sub>	sp <sup>2</sup>
AX <sub>3</sub> E	3	1	Tetrahedral	109.5°	Trigonal Pyramidal	NH <sub>3</sub>	sp <sup>3</sup>
AX <sub>4</sub>	4	0	Tetrahedral	109.5°	Tetrahedral	CH <sub>4</sub>	sp <sup>3</sup>
AX <sub>4</sub> E	4	1	Trigonal Bipyramidal	90°, 120°	See-saw	SF <sub>4</sub>	sp <sup>3</sup> d
AX <sub>5</sub>	5	0	Trigonal Bipyramidal	90°, 120°	Trigonal Bipyramidal	PCl <sub>5</sub>	sp <sup>3</sup> d
AX <sub>5</sub> E	5	1	Octahedral	90°	Square Pyramidal	BrF <sub>5</sub>	sp <sup>3</sup> d <sup>2</sup>
AX <sub>6</sub>	6	0	Octahedral	90°	Octahedral	SF <sub>6</sub>	sp <sup>3</sup> d <sup>2</sup>
AX <sub>6</sub> E	6	1	Octahedral	90°	Square Planar	XeF <sub>4</sub>	sp <sup>3</sup> d <sup>2</sup>
AX <sub>7</sub>	7	0	Pentagonal Bipyramidal	90°, 120°	Pentagonal Bipyramidal	IF <sub>7</sub>	sp <sup>3</sup> d <sup>3</sup>

**Example:** Draw Lewis Structures, Molecular Formulas, Electron GE, Molecular Geometry and Hybridization for 7-10 of the following molecules. Indicate the hybridization of the central atom. (10) For the electron geometry of a molecule, give the number of lone pairs.

**Tip:** If two lone pairs of electrons are present, they form one sp<sup>2</sup> hybrid orbital. The number of orbitals is always equal to the number of hybridizations, and it can also be useful to remember to draw them together as sp<sup>2</sup> hybrid orbitals. The lone pairs are sp<sup>2</sup> hybridizations, and it can also be useful to remember to draw them together as sp<sup>2</sup> hybrid orbitals. The lone pairs are sp<sup>2</sup> hybridizations, and it can also be useful to remember to draw them together as sp<sup>2</sup> hybrid orbitals.

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