

8.1 Molecular Structure: VSEPR Model

The three dimensional arrangement of the atoms is determined by the geometry that minimizes repulsion around a central atom. (used with non-metal compounds)

VSEPR: valence shell electron pair repulsion

Structure	Shared Pairs	Lone Pairs	Shape	Bond Angle
A	2	0	Linear	180
B	3	0	Trigonal Planar	120
C	2	1	Bent	120
D	4	0	Tetrahedron	109.5
E	3	1	Trigonal Pyramidal	~109.5
F	2	2	Bent	~109.5
G	1	3	Linear	(any 2 atom molecule is linear)
Expanded Octet				
H	5	0	Trigonal Bipyramidal	Equatorial: 120 Axial: 90
I	4	1	See Saw (lone pair is eq.)	Equatorial: 120 Axial: 90
J	3	2	T-Shaped (lone pair are eq.)	90
K	2	3	Linear (lone pair are eq.)	180
L	6	0	Octahedron	90
M	5	1	Square Pyramid	90
N	4	2	Square	90
O	3	3	T-shape	90

VSEPR Model and Multiple Bonds: multiple bonds count as an effective pair, shared, and creates a region of electron density. If resonance occurs, any structure can be used to evaluate the shape.

Angles less than 120° are distorted by lone pairs.

Variations of the expanded octet are dictated by size of repulsion groups or lone pair and positioning of the atoms.

Practice Problems for Study: #87, 89, 90, 91, 92, 93, 95, 96, 97, 99, 100, 103, 131