

VSEPR Theory (Molecular Shapes)

A = the central atom, X = an atom bonded to A, E = a lone pair on A

Note: There are lone pairs on X or other atoms, but we don't care. We are interested in only the electron densities or domains around atom A.

Total Domains	Generic Formula	Picture	Bonded Atoms	Lone Pairs	Molecular Shape	Electron Geometry	Example	Hybridization	Bond Angles
1	AX		1	0	Linear	Linear	H ₂	s	180
2	AX ₂		2	0	Linear	Linear	CO ₂	sp	180
	AXE		1	1	Linear	Linear	CN ⁻		
3	AX ₃		3	0	Trigonal planar	Trigonal planar	AlBr ₃	sp ²	120
	AX ₂ E		2	1	Bent	Trigonal planar	SnCl ₂		
	AXE ₂		1	2	Linear	Trigonal planar	O ₂		
4	AX ₄		4	0	Tetrahedral	Tetrahedral	SiCl ₄	sp ³	109.5
	AX ₃ E		3	1	Trigonal pyramid	Tetrahedral	PH ₃		
	AX ₂ E ₂		2	2	Bent	Tetrahedral	SeBr ₂		
	AXE ₃		1	3	Linear	Tetrahedral	Cl ₂		

Total Domains	Generic Formula	Picture	Bonded Atoms	Lone Pairs	Molecular Shape	Electron Geometry	Example	Hybridization	Bond Angles
5	AX_5		5	0	Trigonal bipyramid	Trigonal bipyramid	AsF_5	sp^3d	90 and 120
	AX_4E		4	1	See Saw	Trigonal bipyramid	SeH_4		
	AX_3E_2		3	2	T shape	Trigonal bipyramid	ICl_3		
	AX_2E_3		2	3	Linear	Trigonal bipyramid	BrF_2^-		
6	AX_6		6	0	Octahedral	Octahedral	$SeCl_6$	sp^3d^2	90
	AX_5E		5	1	Square pyramid	Octahedral	IF_5		
	AX_4E_2		4	2	Square planar	Octahedral	XeF_4		

- Notes
1. There are no stable AXE_4 , AX_3E_3 , AX_2E_4 or AXE_5 molecules.
 2. All bonds are represented in this table as a line whether the bond is single, double, or triple.
 3. Any atom bonded to the center atom counts as one domain, even if it is bonded by a double or triple bond. Count atoms and lone pairs to determine the number of domains, do not count bonds.
 4. The number of bonded atoms plus lone pairs always adds up to the total number of domains.