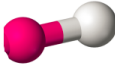
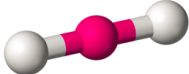
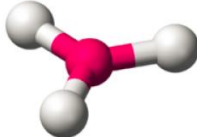
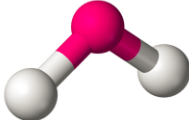
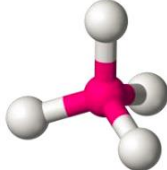
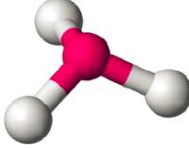
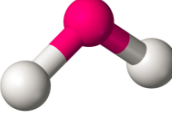
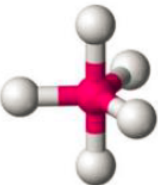
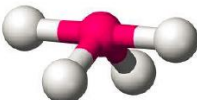
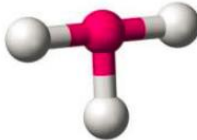
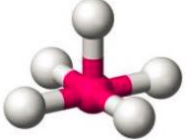
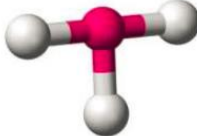


VSEPR

Valence Shell Electron Pair Repulsion

Steric #	X	E	"generic" Looking at shape of everything attached	"specific" Only looking at shape of atoms		
Electron Pairs	Bonded Pairs	Lone Pairs	Electron Geometry (hybridization)	Molecular Geometry (AXE Formula)	Bond Angles	3-D example
2	1	1-3	Linear (sp)	Linear (AXE, AXE ₂ , AXE ₃)	180	
	2	0		Linear (AX ₂)		
3	3	0	Trigonal Planar (sp ²)	Trigonal Planar (AX ₃)	120	
	2	1		Bent (AX ₂ E)	< 120	
4	4	0	Tetrahedral (sp ³)	Tetrahedral (AX ₄)	109.5	
	3	1		Trigonal Pyramidal (AX ₃ E)	< 109.5	
	2	2		Bent (AX ₂ E ₂)	<< 109.5	

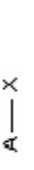
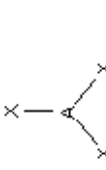
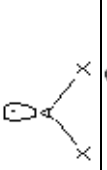
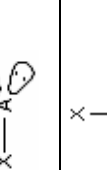
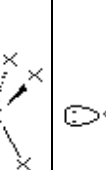
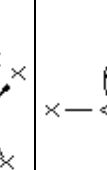
Continued on the back!

Steric #	X	E	"generic" Looking at shape of everything attached	"specific" Only looking at shape of atoms	*it is unclear if d orbitals hybridize – currently we think they do not.	
Electron Pairs	Bonded Pairs	Lone Pairs	Electron Geometry (hybridization)	Molecular Geometry (AXE Formula)	Bond Angles	3-D example
5	5	0	Trigonal Bipyramidal (sp^3d^*)	Trigonal Bipyramidal (AX_5)	90 Axial (above & below) 120 Equatorial (in plane)	
	4	1		Seesaw (AX_4E)	90 120 180	
	3	2		T-Shaped (AX_3E_2)	90 180	
	2	3		Linear (AX_2E_3)	180	
6	6	0	Octahedral (sp^3d^2)	Octahedral (AX_6)	90	
	5	1		Square Pyramidal (AX_5E)	90 180	
	4	2		Square Planar (AX_4E_2)	90 180	
	3	3		T-Shaped (AX_3E_3)	90 180	
	2	4		Linear (AX_2E_4)	180	

VSEPR Theory (Molecular Shapes)

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

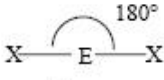
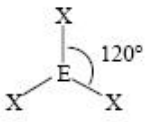
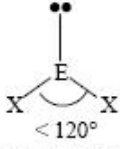
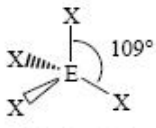
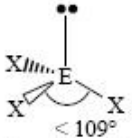
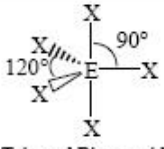
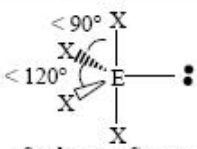
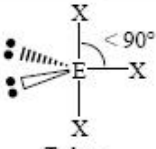
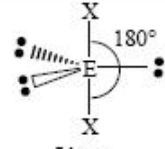
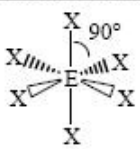
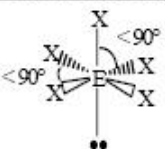
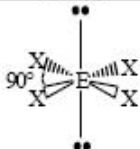
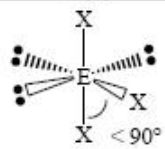
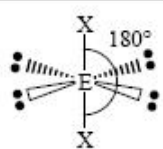
Note: There are lone pairs on X or other atoms, but we don't care. We are interested in only the electron densities or domains around atom A.

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 ³ d	90 and 120
	AX ₄ E		4	1	See Saw	Trigonal bipyramid	SeH ₄		
	AX ₃ E ₂		3	2	T shape	Trigonal bipyramid	ICl ₃		
	AX ₂ E ₃		2	3	Linear	Trigonal bipyramid	BrF ₂ ⁺		
6	AX ₆		6	0	Octahedral	Octahedral	SeCl ₆	sp ³ d ²	90
	AX ₅ E		5	1	Square pyramid	Octahedral	IF ₅		
	AX ₄ E ₂		4	2	Square planar	Octahedral	XeF ₄		

Notes

1. There are no stable AXE₄, AX₃E₃, AX₂E₄ or AXE₅ 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.

VSEPR Geometries					
Steric No.	Basic Geometry 0 lone pair	1 lone pair	2 lone pairs	3 lone pairs	4 lone pairs
2	 Linear				
3	 Trigonal Planar	 Bent or Angular			
4	 Tetrahedral	 Trigonal Pyramid	 Bent or Angular		
5	 Trigonal Bipyramid	 Sawhorse or Seesaw	 T-shape	 Linear	
6	 Octahedral	 Square Pyramid	 Square Planar	 T-shape	 Linear