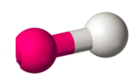
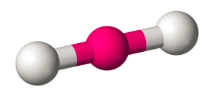
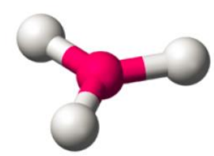
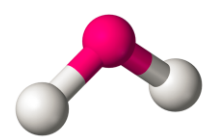
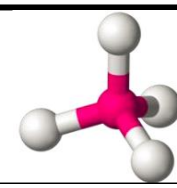
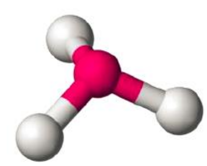
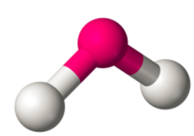
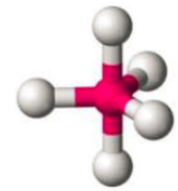
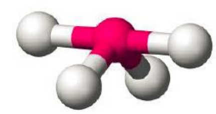
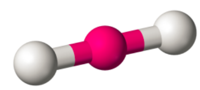
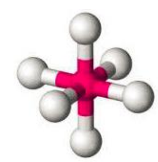
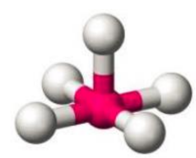
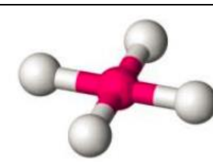
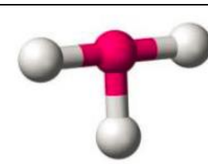
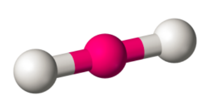
VSEPR

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_2E)	< 120	
4	4	0	Tetrahedral (sp^3)	Tetrahedral (AX_4)	109.5	
	3	1		Trigonal Pyramidal (AX_3E)	< 109.5	
	2	2		Bent (AX_2E_2)	<< 109.5	

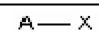
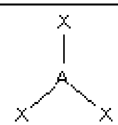
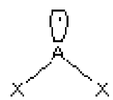
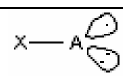
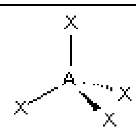
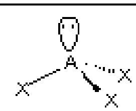
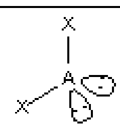
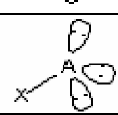
Continued on the back!

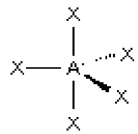
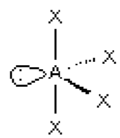
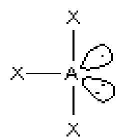
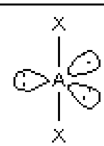
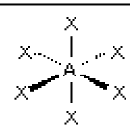
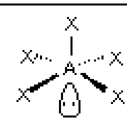
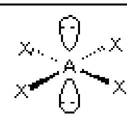
Steric #	X	E	"generic" Looking at shape of everything attached	"specific" Only looking at shape of atoms	*it is unclear if d orbitals hybridize – currently we think they do not.	
Electron Pairs	**Bonded Pairs**	**Lone Pairs**	**Electron Geometry** (hybridization)	**Molecular Geometry** (AXE Formula)	**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	Hybridi-zation	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_2E		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_3E		3	1	Trigonal pyramid	Tetrahedral	PH_3		
	AX_2E_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	Hybridi-zation	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.