

Geometría Molecular

Modelo TRPEV

Documento tomado de:
<http://quimicobach.com/ppt/presentaciones.html>

Fundamentos del TRPEV

1.- La geometría tridimensional de las moléculas está determinada por la orientación relativa de sus enlaces covalentes

2.- La teoría usada para determinarla recibe el nombre de Teoría de Repulsión de los Pares de Electrones de Valencia (TRPEV) y se basa en el simple argumento de que los grupos de electrones (**enlazantes y no enlazantes**) se repelerán unos con otros y la forma que adopta la molécula será aquella en la que la repulsión entre los grupos de electrones sea mínima.

3.- Para la TRPEV los grupos de electrones pueden ser:

ENLAZANTES

NO ENLAZANTES

TABLE 11.1 Molecular Geometry as a Function of Electron Group Geometry




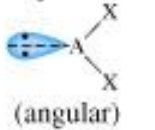





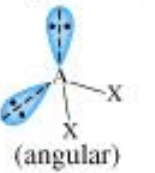



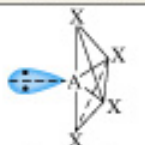
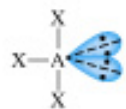
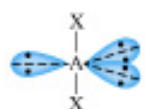
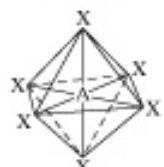
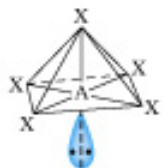
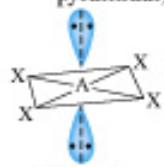
Number of Electron Groups	Electron-Group Geometry	Number of Lone Pairs	VSEPR Notation	Molecular Geometry	Ideal Bond Angles	Example
2	linear	0	AX ₂	X—A—X (linear)	180°	BeCl ₂ 
3	trigonal-planar	0	AX ₃	 (trigonal-planar)	120°	BF ₃ 
	trigonal-planar	1	AX ₂ E	 (angular)	120°	SO ₂ ^a 
4	tetrahedral	0	AX ₄	 (tetrahedral)	109.5°	CH ₄ 
	tetrahedral	1	AX ₃ E	 (trigonal-pyramidal)	109.5°	NH ₃ 
	tetrahedral	2	AX ₂ E ₂	 (angular)	109.5°	H ₂ O 
5	trigonal-bipyramidal	0	AX ₅	 (trigonal-bipyramidal)	90°, 120°	PCl ₅ 

TABLE 11.1 (Continued)

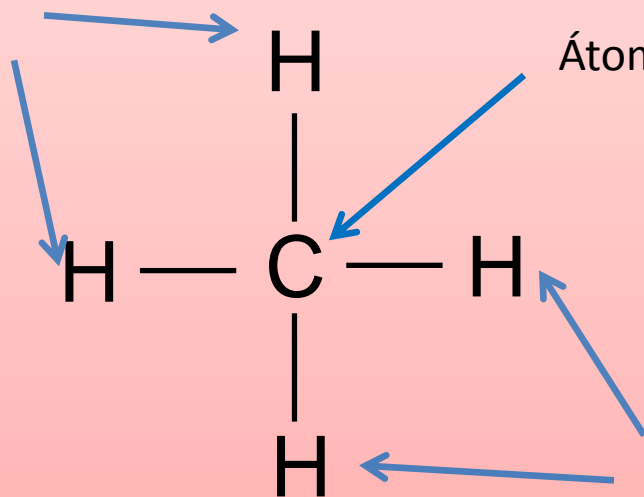
Number of Electron Groups	Electron-Group Geometry	Number of Lone Pairs	VSEPR Notation	Molecular Geometry	Ideal Bond Angles	Example
	trigonal-bipyramidal	1	AX_4E^b	 (seesaw)	$90^\circ, 120^\circ$	SF_4
	trigonal-bipyramidal	2	AX_3E_2	 (T-shaped)	90°	ClF_3
	trigonal-bipyramidal	3	AX_2E_3	 (linear)	180°	XeF_2
6	octahedral	0	AX_6	 (octahedral)	90°	SF_6
	octahedral	1	AX_5E	 (square-pyramidal)	90°	BrF_5
	octahedral	2	AX_4E_2	 (square planar)	90°	XeF_4

(SF₆)

TOMADO POR SUZUEN GIRALDO DE:

<http://quimicobach.com/ppt/presentacion>^aFor a discussion of the structure of SO_2 , see page 416.^bFor a discussion of the placement of the lone-pair electrons in this structure, see page 412.

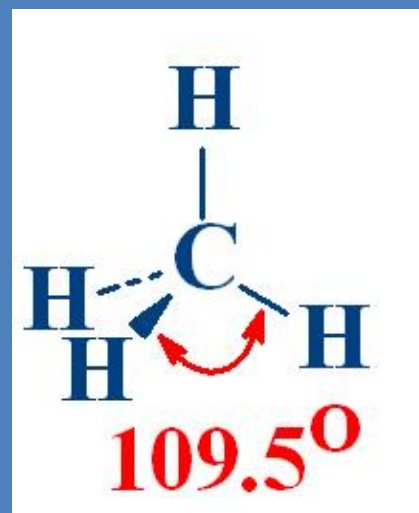
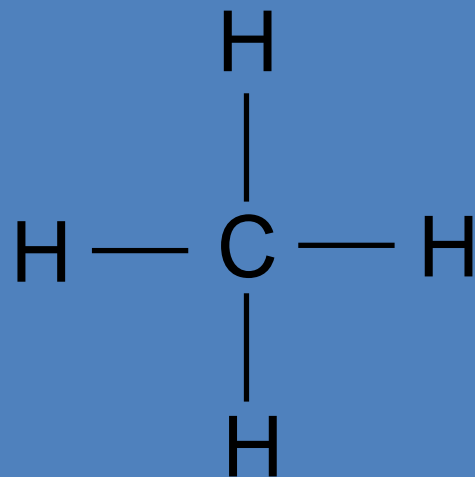
2 Átomos unidos al
Átomo Central (X)



Átomo Central (A)

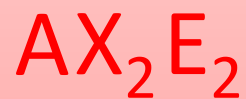
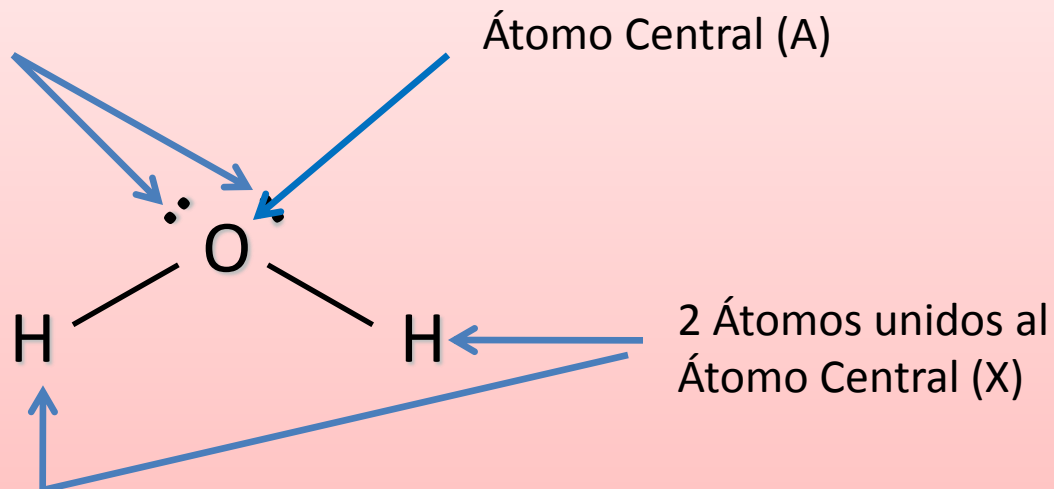
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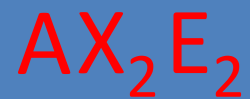
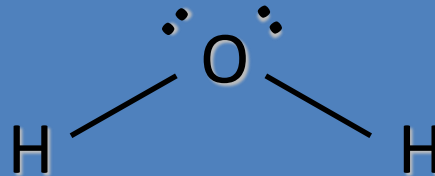
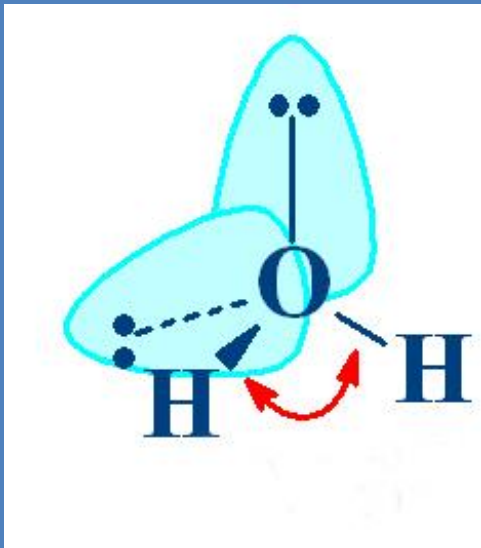


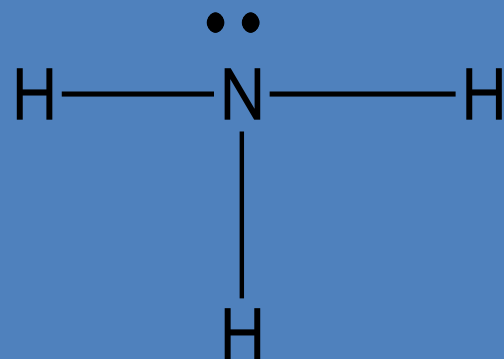


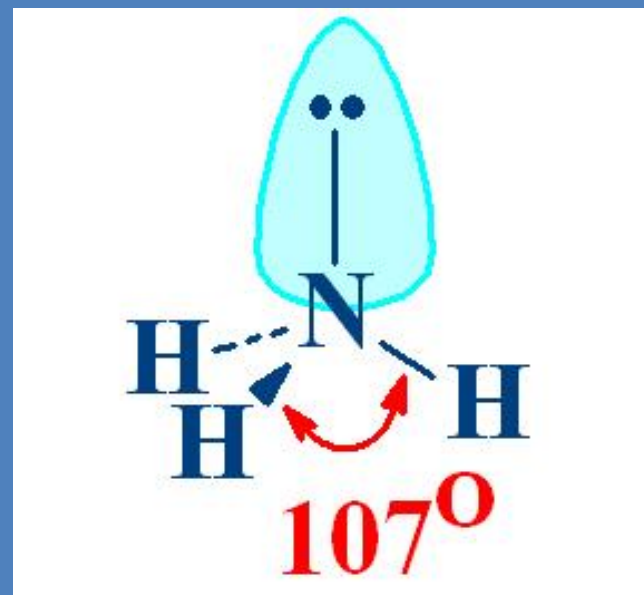
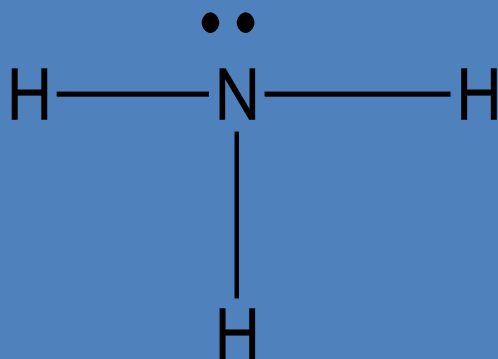
TOMADO POR EFRÉN GIRALDO DE.

Pares de electrones
no enlazantes (2)

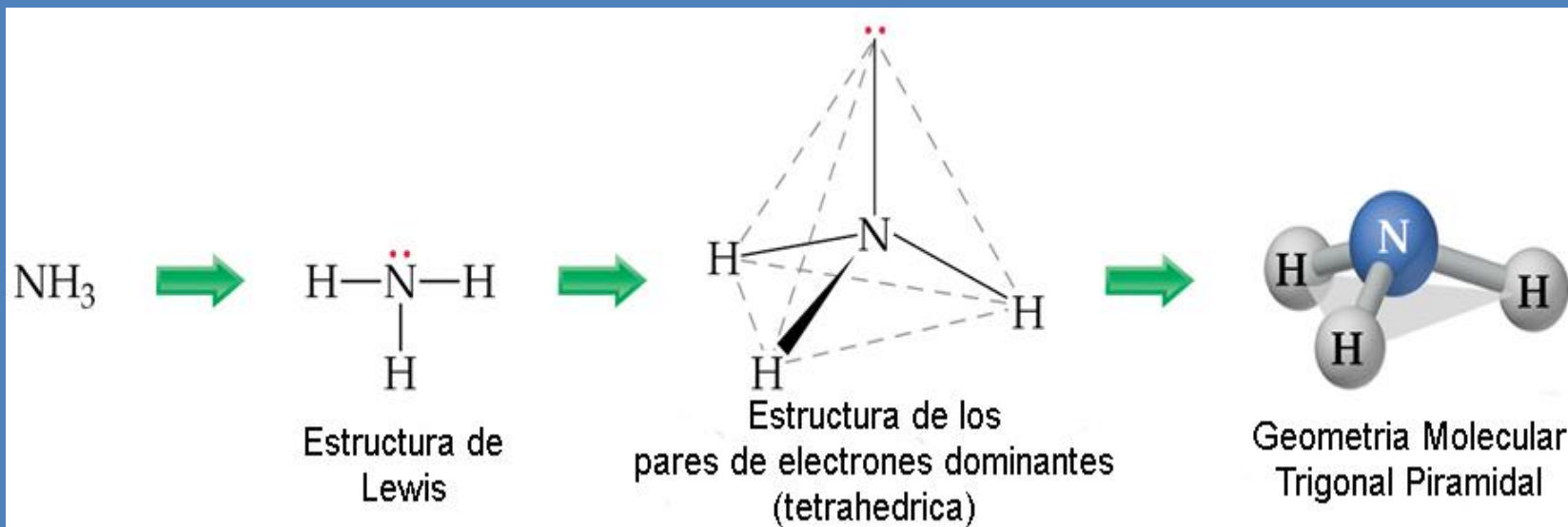


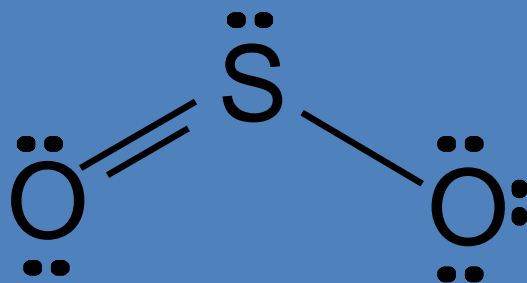






AX_3E



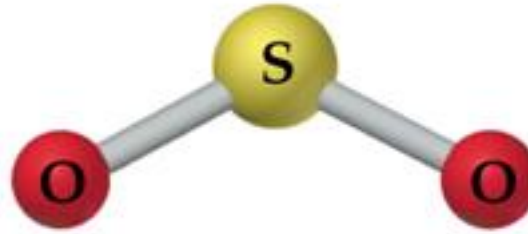


AX₂E

AB_2

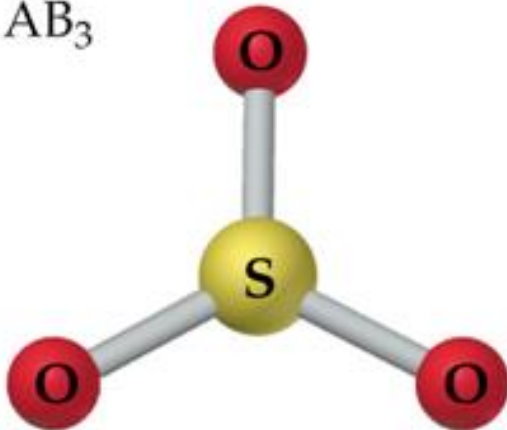


Lineal

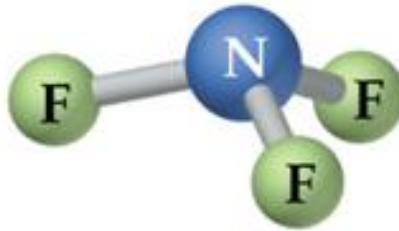


Doblada

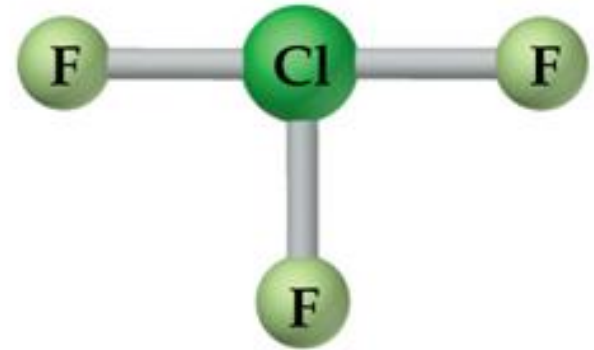
AB_3



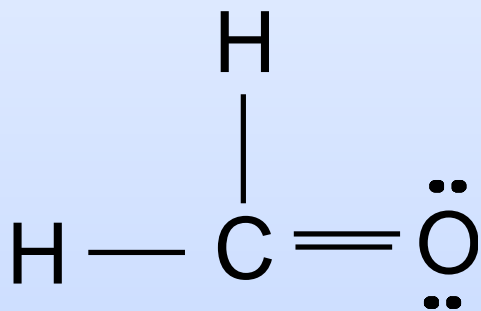
Trigonal Plana



Trigonal Piramidal



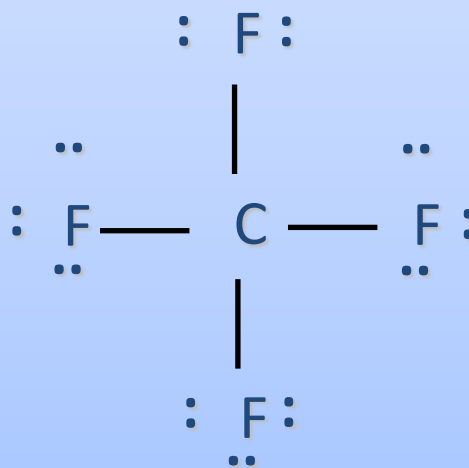
Forma de T



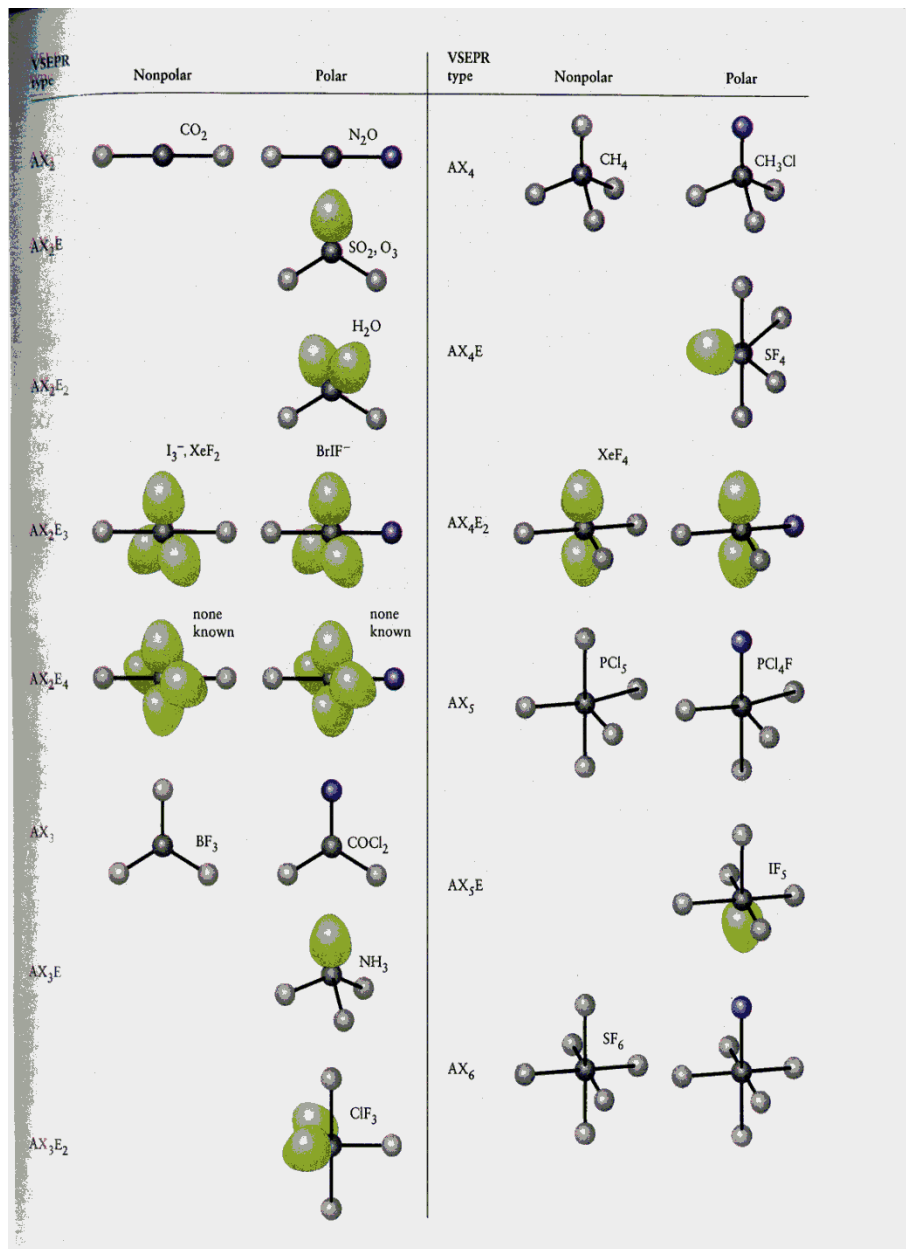
AX_3



AX_2


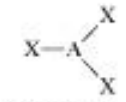

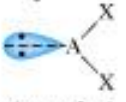





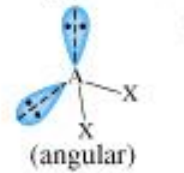


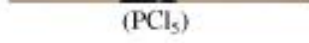


AX_4

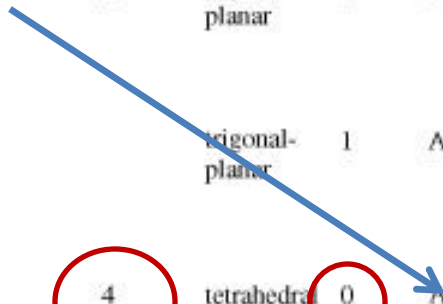


Final

TABLE 11.1 Molecular Geometry as a Function of Electron Group Geometry

Number of Electron Groups	Electron-Group Geometry	Number of Lone Pairs	VSEPR Notation	Molecular Geometry	Ideal Bond Angles	Example
2	linear	0	AX ₂	X—A—X (linear)	180°	BeCl ₂ 
3	trigonal-planar	0	AX ₃	 (trigonal-planar)	120°	BF ₃ 
3	trigonal-planar	1	AX ₂ E	 (angular)	120°	SO ₂ ⁺ 
4	tetrahedral	0	AX ₄	 (tetrahedral)	109.5°	CH ₄ 
4	tetrahedral	1	AX ₃ E	 (trigonal-pyramidal)	109.5°	NH ₃ 
4	tetrahedral	2	AX ₂ E ₂	 (angular)	109.5°	OH ₂ 
5	trigonal-bipyramidal	0	AX ₅	 (trigonal-bipyramidal)	90°, 120°	PCl ₅ 

AX₄



Pares de electrones implicados:

4

Pares de electrones solitarios:

0

Forma de la Molecula:


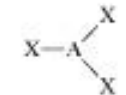




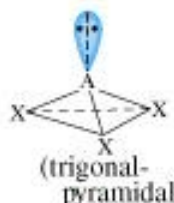
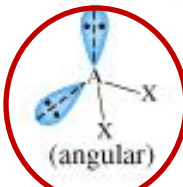


Tetrahedica

Angulo de los enlaces covalentes:

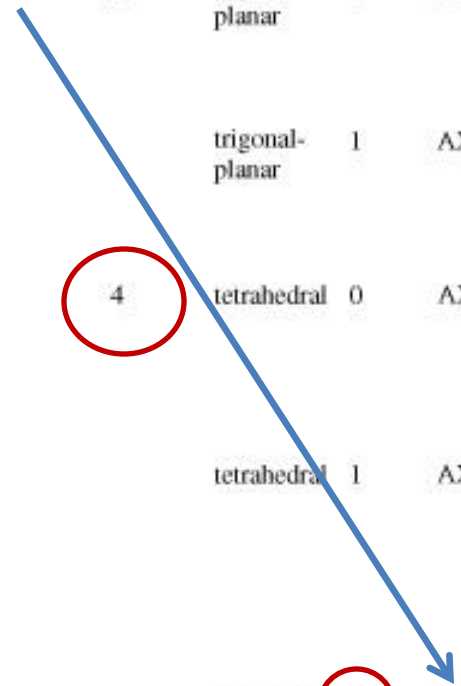
109.5

Regresar

TABLE 11.1 Molecular Geometry as a Function of Electron Group Geometry

Number of Electron Groups	Electron-Group Geometry	Number of Lone Pairs	VSEPR Notation	Molecular Geometry	Ideal Bond Angles	Example
2	linear	0	AX ₂	X—A—X (linear)	180°	BeCl ₂ 
3	trigonal-planar	0	AX ₃	 (trigonal-planar)	120°	BF ₃ 
	trigonal-planar	1	AX ₂ E	 (angular)	120°	SO ₂ [†] (BF ₃)
4	tetrahedral	0	AX ₄	 (tetrahedral)	109.5°	CH ₄ 
	tetrahedral	1	AX ₃ E	 (trigonal-pyramidal)	109.5°	NH ₃
4	tetrahedral	2	AX ₂ E ₂	 (angular)	109.5°	H ₂ O 
	5	trigonal-bipyramidal	0	AX ₅	 (trigonal-bipyramidal)	90°, 120°

AX₂E₂



Pares de electrones implicados:

4

Pares de electrones solitarios:

2

Forma de la Molecula:


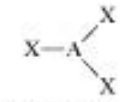

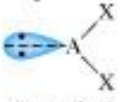



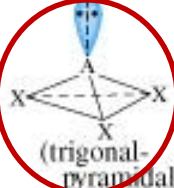

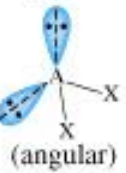



Angular

Angulo de los enlaces covalentes:

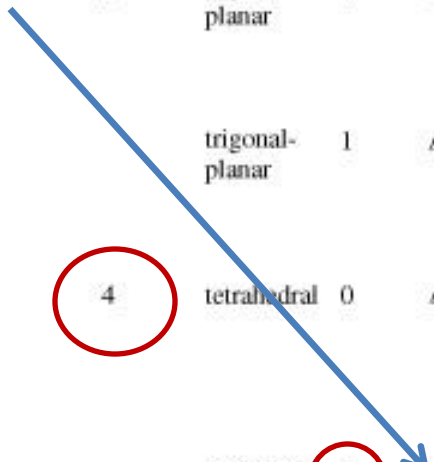
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Regresar

TABLE 11.1 Molecular Geometry as a Function of Electron Group Geometry

Number of Electron Groups	Electron-Group Geometry	Number of Lone Pairs	VSEPR Notation	Molecular Geometry	Ideal Bond Angles	Example
2	linear	0	AX ₂	X—A—X (linear)	180°	BeCl ₂ 
3	trigonal-planar	0	AX ₃	 (trigonal-planar)	120°	BF ₃ 
	trigonal-planar	1	AX ₂ E	 (angular)	120°	SO ₂ ⁺ 
4	tetrahedral	0	AX ₄	 (tetrahedral)	109.5°	CH ₄ 
	tetrahedral	1	AX ₃ E	 (trigonal-pyramidal)	109.5°	NH ₃ 
	tetrahedral	2	AX ₂ E ₂	 (angular)	109.5°	OH ₂ 
5	trigonal-bipyramidal	0	AX ₅	 (trigonal-bipyramidal)	90°, 120°	PCl ₅ 

AX₃E



Pares de electrones implicados:

4

Pares de electrones solitarios:

1

Forma de la Molecula:


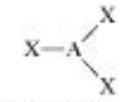

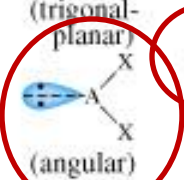


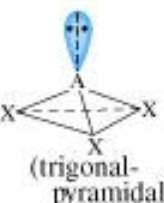
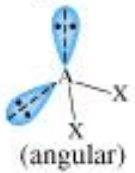


Trigonal Piramidal

Angulo de los enlaces covalentes:

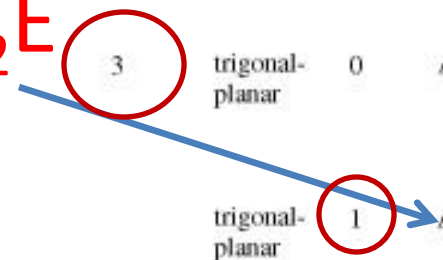
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Regresar

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	trigonal-planar	1	AX ₂ E	 (angular)	120°	SO ₂ ^a (BF ₃)
4	tetrahedral	0	AX ₄	 (tetrahedral)	109.5°	CH ₄ 
	tetrahedral	1	AX ₃ E	 (trigonal-pyramidal)	109.5°	NH ₃
	tetrahedral	2	AX ₂ E ₂	 (angular)	109.5°	OH ₂
5	trigonal-bipyramidal	0	AX ₅	 (trigonal-bipyramidal)	90°, 120°	PCl ₅ 

AX₂E



Pares de electrones implicados:

3

Pares de electrones solitarios:

1

Forma de la Molecula:

Angular

Angulo de los enlaces covalentes:

120

Regresar