

Molecular Geometry

The 3-D arrangement of a molecule's atoms in space.

The VSEPR Model

(Valence Shell Electron Pair Repulsion)

Predicts molecular:

- shape (geometry)
- bond angles
- polarity

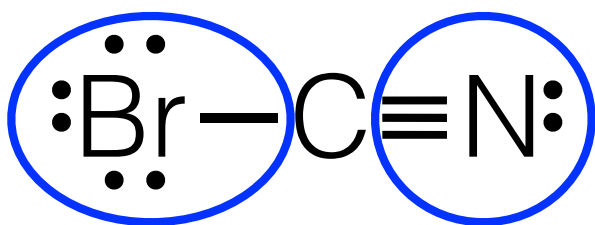
Determine VSEPR shape by counting e⁻ domains around central atom

type	e⁻ domain	
bonding	single bond	—
	double bond	=
	triple bond	≡
non-bonding	lone pair	••

all count as one e⁻ domain

Linear

Ex. BrCN



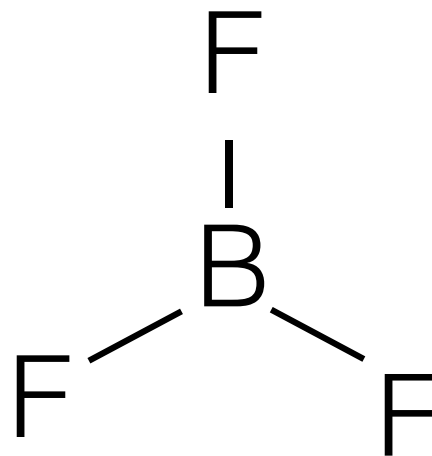
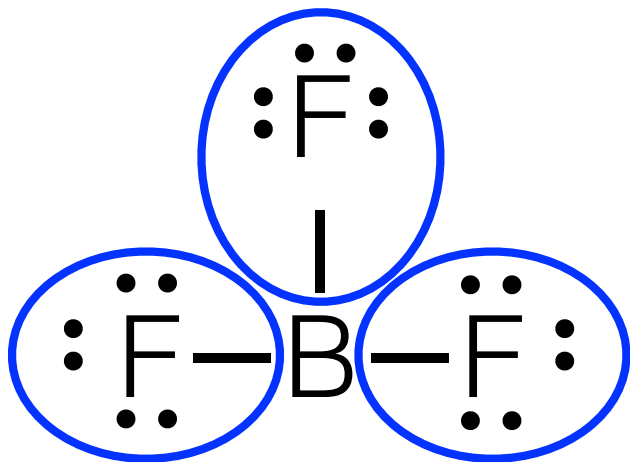
2 e⁻ domains:

2 bonding

Bond angle: 180°

Trigonal Planar

Ex. BF_3



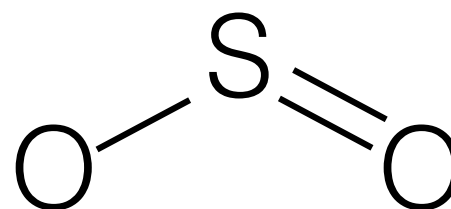
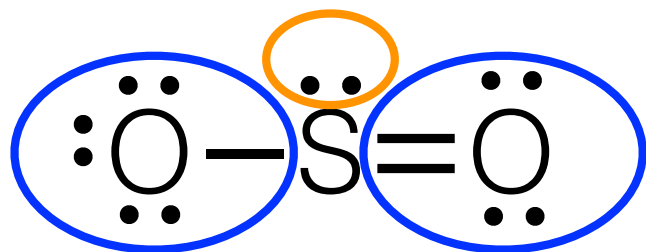
3 e⁻ domains:

3 bonding

Bond angle: 120°

Bent

Ex. SO_2



3 e⁻ domains:

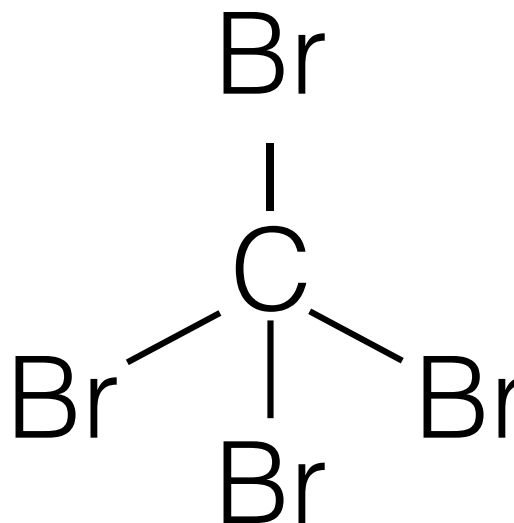
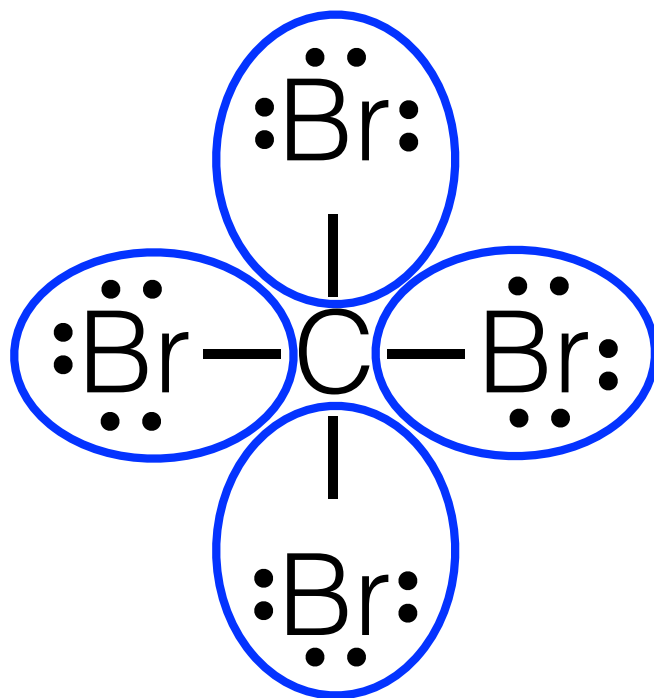
2 bonding

1 non-bonding

Bond angle: $\sim 119^\circ$

Tetrahedral

Ex. CBr_4



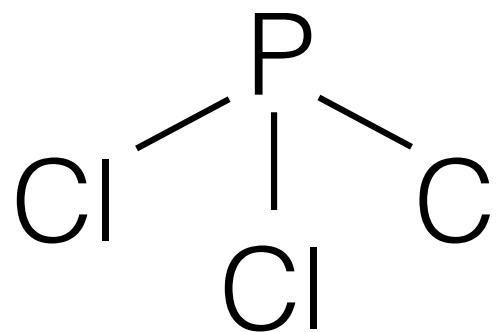
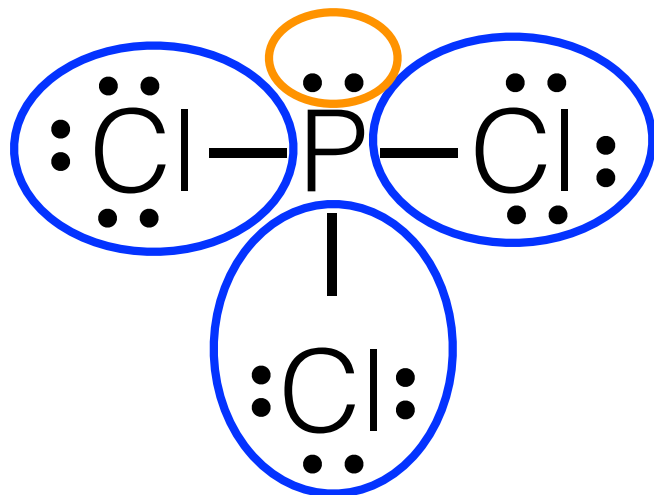
4 e^- domains:

4 bonding

Bond angle: 109.5°

Pyramidal

Ex. PCl_3



4 e⁻ domains:

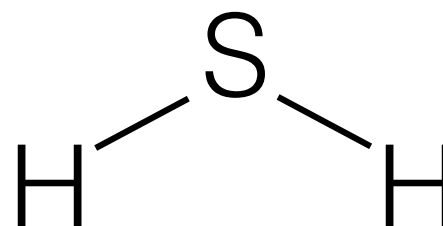
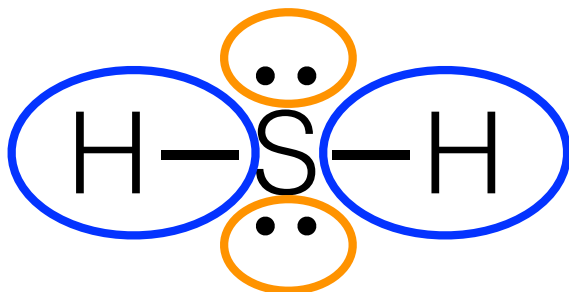
3 bonding

1 non-bonding

Bond angle: $\sim 107^\circ$

Bent

Ex. H₂S



4 e⁻ domains:

2 bonding

2 non-bonding

***Note: There are *two* types of bent, but they have *different* bond angles!**

Bond angle: ~104.5°