



Polar Molecules

Chapter 9
Gen Chem I
Stan State



Is there a polar bond?

Is the shape of the molecule asymmetric?

Polar bonds have differences in electronegativities between the atoms.

$\Delta EN > 2$ = ionic

$0.5 < \Delta EN < 2$ = polar covalent

Electronegativity trend:

$F > O > N = Cl >> C = H$

1. Look for F, O, N, Cl
2. Look at the shape, is it asymmetric?

Carbon dioxide: $O=C=O$, linear

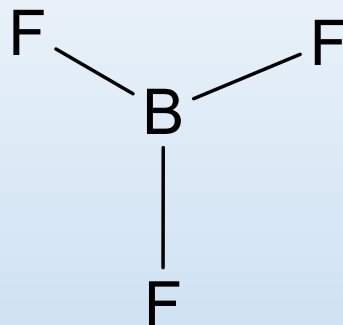
1. Yes there is O
2. It is a symmetric molecule

Therefore carbon dioxide is not polar

Polar?

Boron trifluoride

1. F, O, N, or Cl?
2. Symmetric?



SN = 3

Hybridization = sp^2

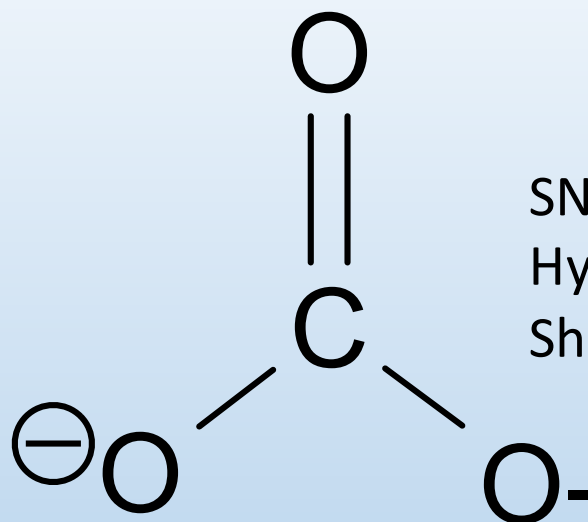
Shape = trigonal
planar

BF_3 is non polar, it has F, but it is a symmetric molecule.

Polar?

Carbonate ion

1. F, O, N, or Cl?
2. Symmetric?



SN = 3

Hybridization = sp^2

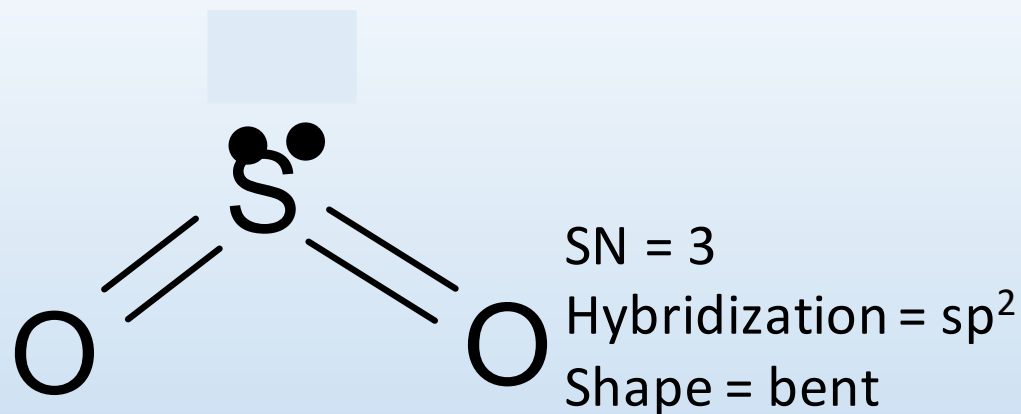
Shape = trigonal planar

CO_3^{2-} is polar, it has O, and it is an asymmetric molecule.

Polar?

Sulfur dioxide

1. F, O, N, or Cl?
2. Symmetric?

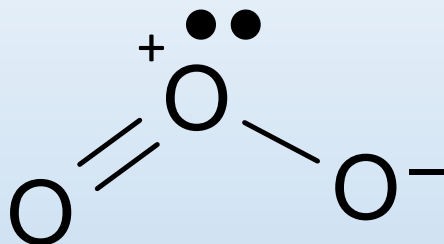


SO_2 is polar, it has O, and it is an asymmetric molecule.

Polar?

Ozone

1. F, O, N, or Cl?
2. Symmetric?



SN = 3

Hybridization = sp^2

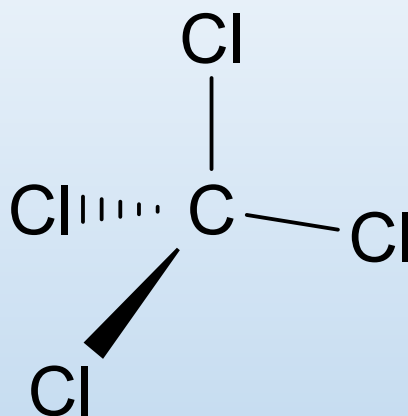
Shape = bent

O₃ is polar, it has O, and it is an asymmetric molecule.

Polar?

Carbon tetrachloride

1. F, O, N, or Cl?
2. Symmetric?



SN = 4

Hybridization = sp^3

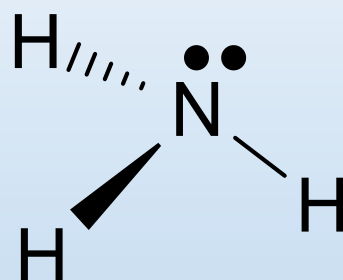
Shape = tetrahedral

CCl_4 is non polar, it has Cl, but it is a symmetric molecule.

Polar?

Ammonia

1. F, O, N, or Cl?
2. Symmetric?



SN = 4

Hybridization = sp^3

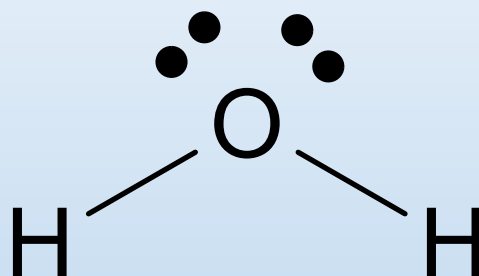
Shape = trigonal pyramidal

NH₃ is polar, it has N, and it is an asymmetric molecule.

Polar?

Water

1. F, O, N, or Cl?
2. Symmetric?



SN = 4

Hybridization = sp^3

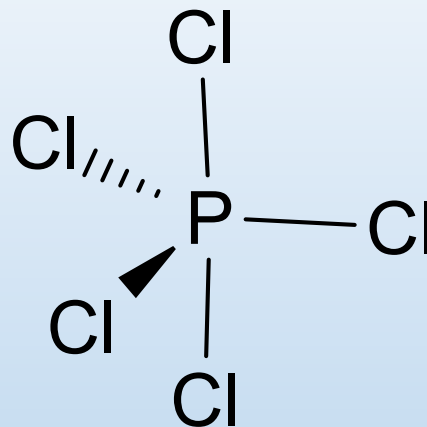
Shape = bent

H_2O is polar, it has O, and it is an asymmetric molecule.

Polar?

Phosphorous pentachloride

1. F, O, N, or Cl?
2. Symmetric?



SN = 5

Hybridization = sp^3d

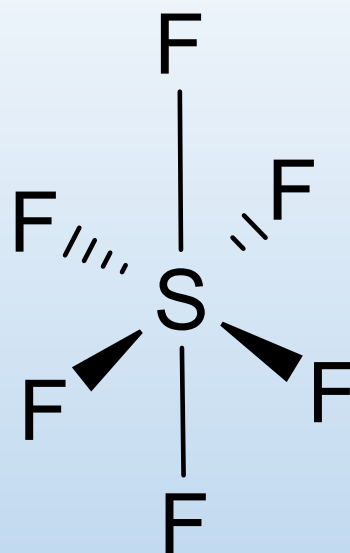
Shape = trigonal
bipyramidal

PCl_5 is non polar, it has Cl, but it is a symmetric molecule.

Polar?

Sulfur hexafluoride

1. F, O, N, or Cl?
2. Symmetric?



SN = 6

Hybridization = sp^3d^2

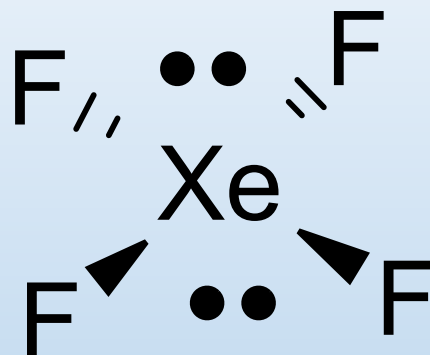
Shape = octahedral

SF_6 is non polar, it has F, but it is a symmetric molecule.

Polar?

Xenon tetrafluoride

1. F, O, N, or Cl?
2. Symmetric?



SN = 6

Hybridization = sp^3d^2

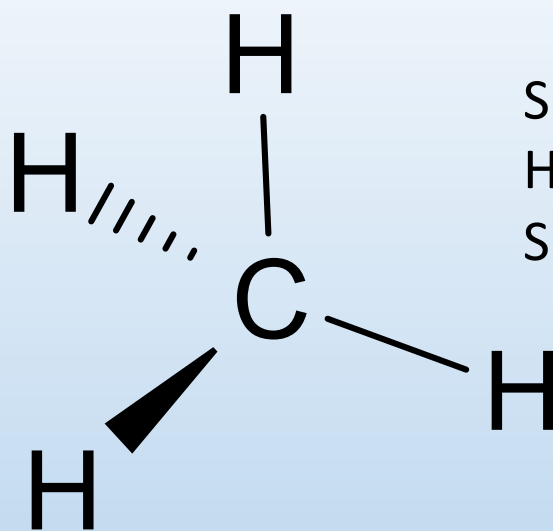
Shape = square planar

XeF_4 is non polar, it has F, but it is a symmetric molecule.

Polar?

Methane, CH₄

1. F, O, N, or Cl?
2. Symmetric?



SN = 4

Hybridization = sp³

Shape = tetrahedral

CH₄ is non polar, it has no F, O,N,Cl