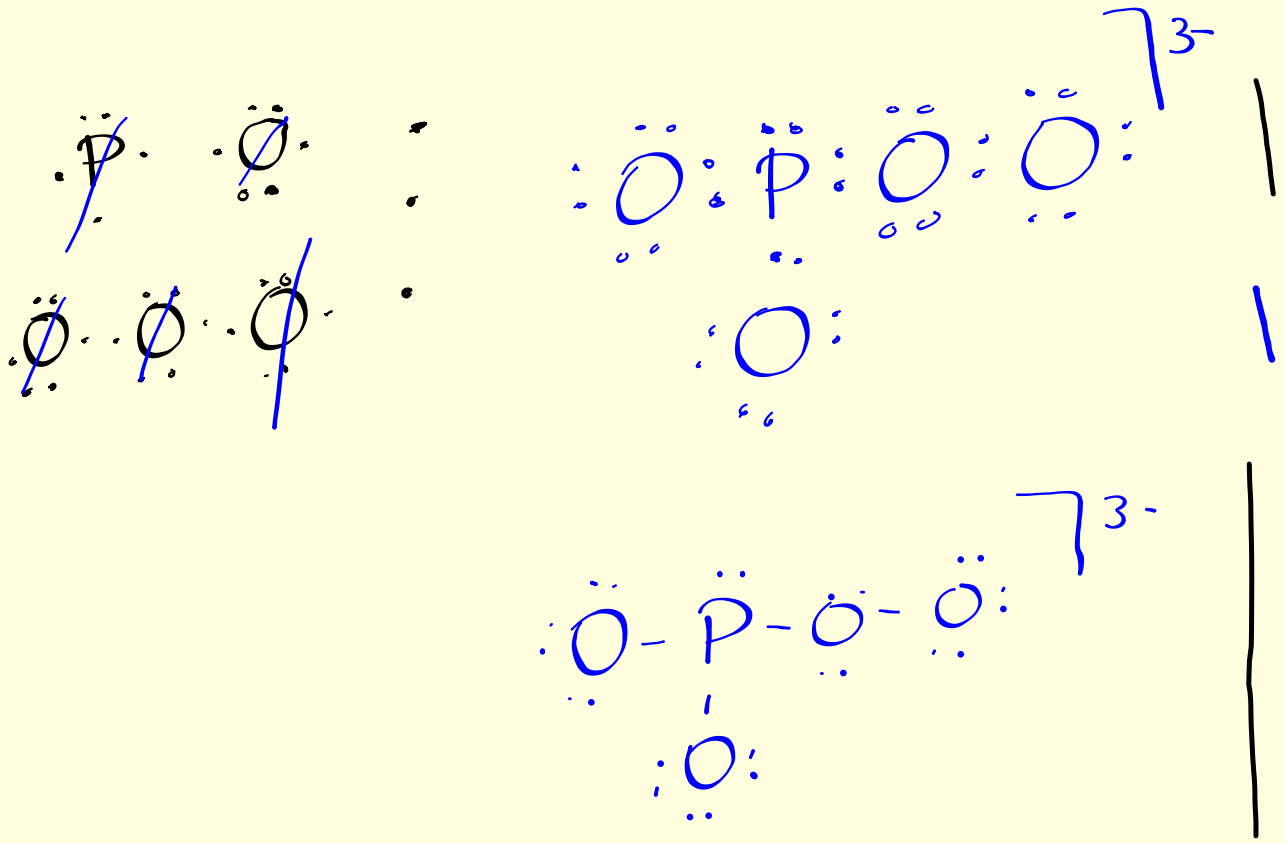
Warm Up

Draw an electron dot structure and structural diagram for the following:

PO_4^{3-}



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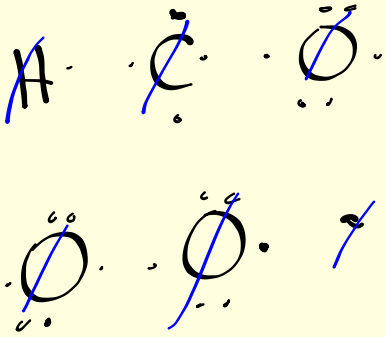
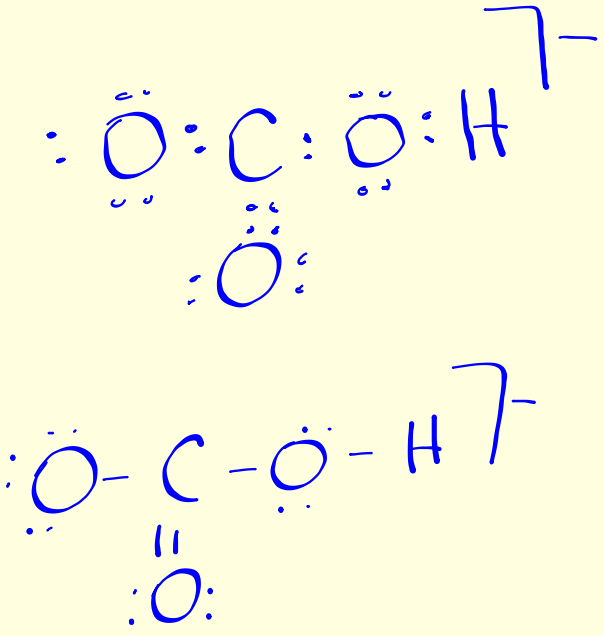
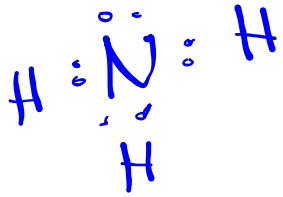
Worksheet

(12) HCO_3^-

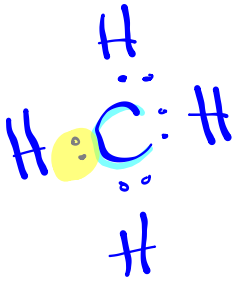


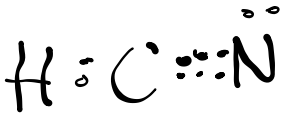


NH_3



Br_2





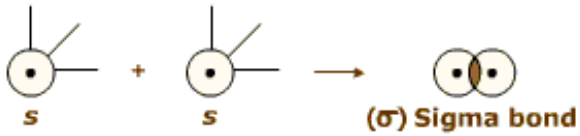
Molecular Orbitals

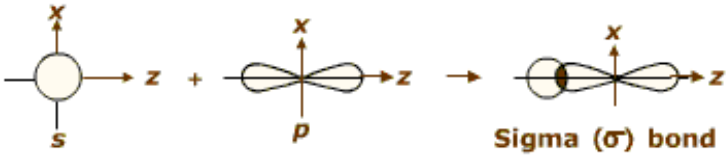
When two atoms share electrons to form a molecule, their atomic orbitals combine to produce molecular orbitals.

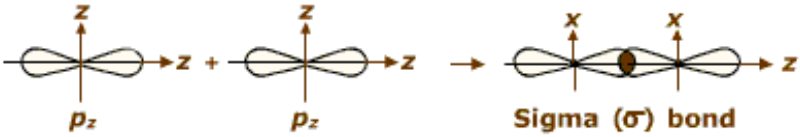
When the orbital is filled with two electrons, it is called a **bonding orbital**.

Sigma bond

Bond that forms when two atomic orbitals overlap head-on.
-strong bond

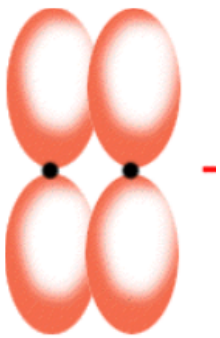


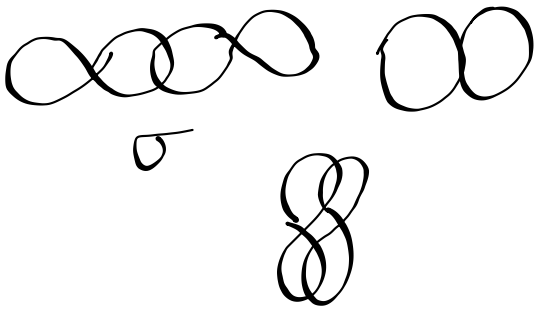




Pi bond

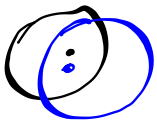
Bond that forms when two atomic orbitals overlap side-by-side.
-orbitals overlap less than in sigma bonds, thus the bonds are weaker than sigma bonds.





H_2

H : H

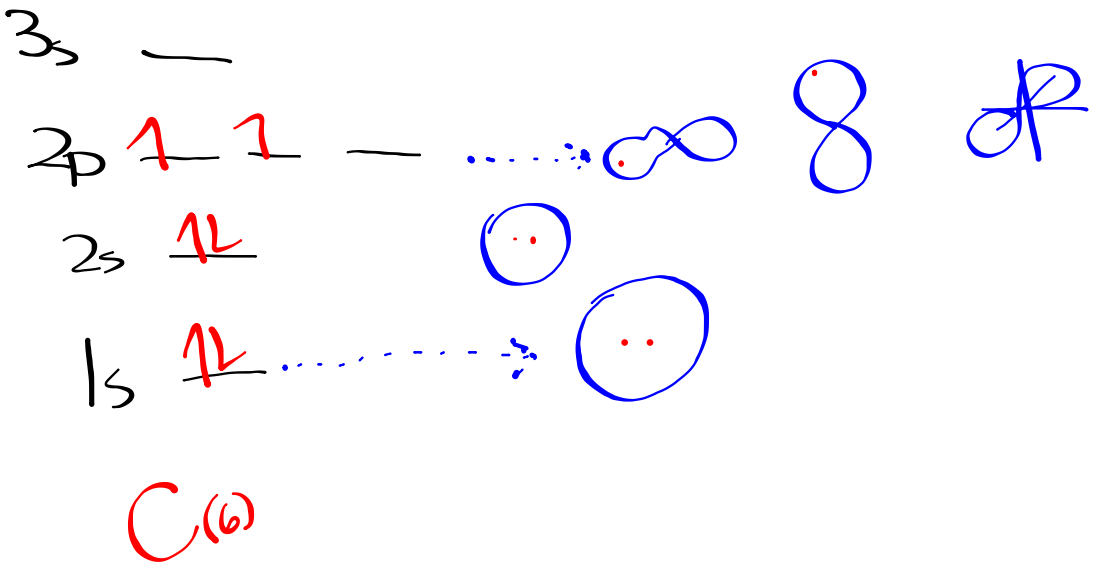


1s 1

H

1s 1

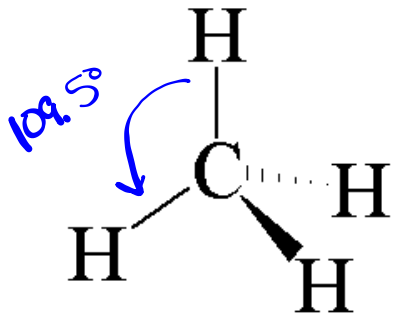
H

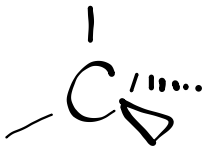

3s
2p
2s
1s
C(6)

VSEPR Theory

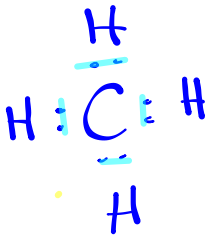
Valence-Shell Electron-Pair Repulsion Theory
Repulsion between electron pairs causes molecular shapes to adjust so that the valence-electron pairs are as far apart as possible.

Ex. CH_4

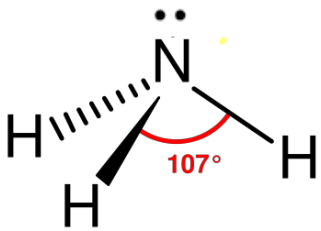




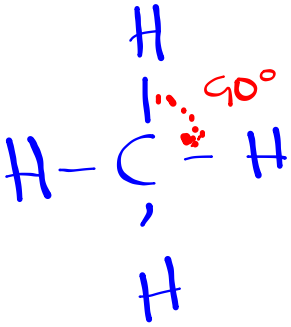
tetrahedral angle (109.5°)



Ex. NH_3



Lone pairs (unshared pairs) also affect the shapes of molecules.


90°