[redacted] Key

[redacted] Bonds and Hybridization

1) What is an orbital?

Regions of space where electrons reside

2) What two types of molecular orbitals can there be when determining bond order, and how do we denote the difference when labeling them?

Either two bonding or two antibonding orbitals.

$\cap + \cap \rightarrow \bigcap$ (bonding)

$\cap + V \rightarrow \cup$ (antibonding, denoted w/ a *)

3) What does it mean when orbitals hybridize?

It just means that they combine.

4) What bond angles are present in the following molecular geometries?

a) Tetrahedral — 109.5° → sp^3 (4 electron domains)

b) Trigonal Planar — 120° → sp^2 (3 electron domains)

c) Linear — 180° → sp (2 electron domains)

5) What two things can an electron domain be?

1. Single or multiple-bonded elements
2. Nonbonding electron pair

[redacted]

Thanks to Haley Schultz for this worksheet!

6) What is the purpose of having specific bond angles?

To minimize electron - electron repulsion (the electron pairs / elements are as far away as physically possible in each structure).

7) What is the most stable bond angle and molecular geometries?

The most stable bond angle is 109.5° and it is found in tetrahedral geometries. This is optimal because the electrons are far enough apart that repulsion is minimized & it is also the easiest way to reach an octet.