**Exercise #3:** **Practice with the Language of Pauling’s Valence Hybrid Model (spn)**

#  Organic Chem I Alfred State College

**3.1. (s,p) atomic shapes vs. (s, p) molecular combos**

 **Un- hybridized atomic shapes shape when hybridized in molecule**





**s + 1 (one) p**



**s + 2(two) p above +**







**s + 3 (three) p above +**

 **(pz out of page)**

**3.2 Describe the hybridization on the indicated atoms in the molecules below**

**N**H3 \_\_sp3\_\_\_\_\_ on **N** **N**O2- \_\_\_sp2\_\_\_\_\_ on **N**

**CO** \_sp\_\_\_\_\_ on **C** **CO**2 \_\_\_\_sp\_\_\_\_ on **C**

 \_\_sp\_\_\_\_ on **O** \_sp2\_\_\_\_\_\_\_ on **O**

H2**CO** \_\_\_sp2\_\_\_ on **C** **C**H3**O**H \_\_\_sp3\_\_\_\_\_ on **C**

(formaldehyde) (methanol)

 \_sp2\_\_ on **O**  \_sp3\_\_\_\_\_\_\_ on **O**

 (a) (b) (a)

H**C**≡**C**H \_\_sp\_\_ on **C** **C**H3-**C**-**C**H3  \_\_\_\_\_sp3\_\_\_\_\_\_ on **Ca**

(acetylene) ||

 **O** \_\_\_sp2\_\_\_\_\_ on **Cb**

(acetone)

\_\_\_sp2\_\_\_\_\_\_\_ on **O**

**3.3 List the C valence atomic orbitals (AO) involved in making the σ (sigma)**

 **bond linkages in ethene assuming the x,y, z axes are defined as below:**



 z

x AO involved in σ\_\_\_s ,px, pz\_\_\_\_

 y

How many sigma bonds are shown here ?\_\_5\_\_\_\_

Sketch how and where the π (pi) bond in ethene forms and identify the p orbital involved assuming the x,y,z axes orientations below:



Sigma in x-z plane







 C C C C



 uncombined p

combined as π orbital

 py