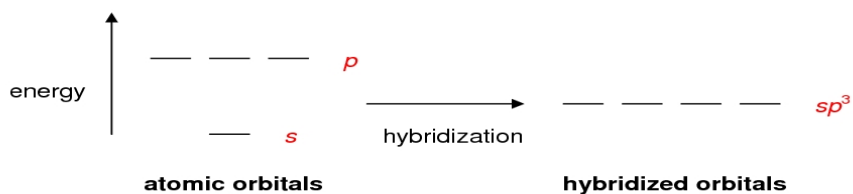


Worksheet 16 - Hybridization

When atoms bond to form molecules, they use **molecular orbitals**. These are formed through the **hybridization** of the **atomic orbitals** that we have already discussed, **s**, **p**, and **d** orbitals.

The **hybridized molecular orbitals** have different shapes and energy levels than the **atomic orbitals**. The number of molecular orbitals created by hybridization depends on the number of atomic orbitals that are mixed to form them.

In forming **sp^3** hybridized orbitals, **four** atomic orbitals are mixed, one **s** and three **p**. The energy diagram for this process is shown below. The hybridized orbitals are higher in energy than the **s** orbital, but lower in energy than the **p** orbitals, following Hund's rule.



Carbon has 4 valence electrons. Add these electrons to the atomic and molecular orbitals. This hybridization gives **tetrahedral geometry**.

With this hybridization, C will form **four equivalent σ bonds**.

Draw a similar energy diagram for **sp^3** hybridized **oxygen**.

How many σ bonds will be formed?

How are the other sp^3 orbitals used?

Do the same for **sp^3** hybridized **nitrogen**.