

Valence Bond Theory and Hybridization

Explain the difference between a σ bond and π bond.

A σ bond is due to end to end overlap of p orbitals or overlap of s orbitals or an overlap between s and p orbitals. All single bonds are σ bonds. The π bond is due to side to side overlap of p orbitals. There is one π bond in a double bond and 2 π bonds in a triple bond.

What hybridization is expected for atoms that have the following numbers of charge clouds?

a.) 2 sp

b) 3 sp^2

c) 4 sp^3

What hybridization is expected for the underlined atom in each of the following: (**Hint:** Draw the Lewis Structure)

a) BH₃

sp^2

b) BH₄⁻

sp^3

c) H₂CO

sp^2

d) CH₂NH₂

C is sp^3
N is sp^3

c) CH₃⁻

sp^3

d) CH₃⁺

sp^2

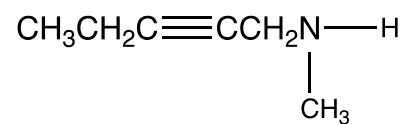
Indicate the types of orbital overlap for the two carbon atoms in CH₃COOH. What is the hybridization of the two carbons and two oxygens?

Carbon 1: C sp^3 → H s and C sp^3 → C sp^2

Carbon 2: C sp^2 → C sp^3 , C sp^2 → O sp^3 , C sp^2 → O sp^3

C1 is sp^3 hybridized, C2 is sp^2 hybridized, and O is sp^3 hybridized.

How many sigma bonds? How many pi bonds?



There are 2 pi bonds and 17 sigma bonds