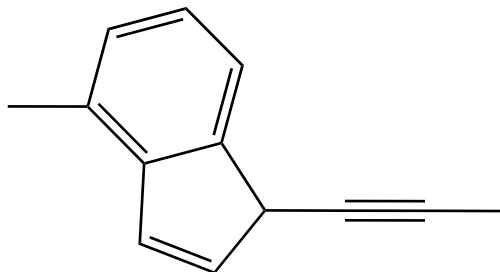


Chem 4A Scholars Worksheet 9

Valence Bond Theory

Questions:

1. Consider the following molecule,



What is the number of σ and π bonds between carbons?

Write down the hybridization configuration for each of the carbon atom.

Between carbons, How many electrons are localized (only shows between two particular atoms)? How many electrons are delocalized?

2. Consider the molecule with formula C_3H_4 . It is known that the carbon atoms in the molecule are in a line, draw the Lewis structure of carbon.

Now write down the hybridization for each carbon atom.

Use the information from your answer to the last two questions, draw the orbital interactions the molecule, clearly indicate the shape and orientation of each bond.

Now draw the 3D structure of the molecule.

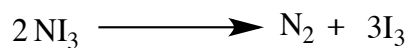
Do you expect there to be any delocalized bonds? Why?

Now consider $C_3BrHClF$, where three of the hydrogens are replaced by halogens, Draw all the isomers for this formula/.

3. Watch the video: <https://www.youtube.com/watch?v=2KlAf936E90>

The compound of interest here is NI_3 , it is highly unstable. Dry NI_3 explode upon slightest vibration and produce elemental nitrogen and iodine.

Write the reaction formula.



With valence bond and geometric argument, explain why the product side is highly favored.

4. It is known that d orbitals can also make bonds, depending on the orientation of the d orbitals, they can make π or δ bond. Guess and sketch how two d_{xy} orbitals can make these bonds.