

Problem Set 1
Carbon Compounds and Chemical Bonds

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Group 1

1. Consider the chemical species in which a carbon atom forms two single bonds to two hydrogen atoms and possesses a nonbonded electron pair.

- a) What formal charge would the carbon have?
- b) What would the hybridization state of the carbon be?
- c) What orbital would the lone pair occupy?
- d) Draw the structure in 3-D and label the bond angle.

Answer the questions above for a species where carbon has 3 hydrogens attached and a lone pair.

Group 2

2. Draw all the constitutional isomers of trichloropropane.

Group 3

3. Write structural formulas (Lewis) for four constitutional isomers with the formula CH_2N_2 . Label the hybridization of all atoms.

Group 4

4. Devise two structures, each having two sp -hybridized carbons and the molecular formula $\text{C}_4\text{H}_6\text{O}$. Create one of these structures such that it is linear with respect to all carbon atoms.