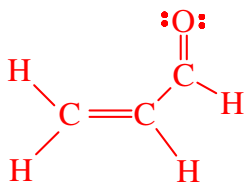
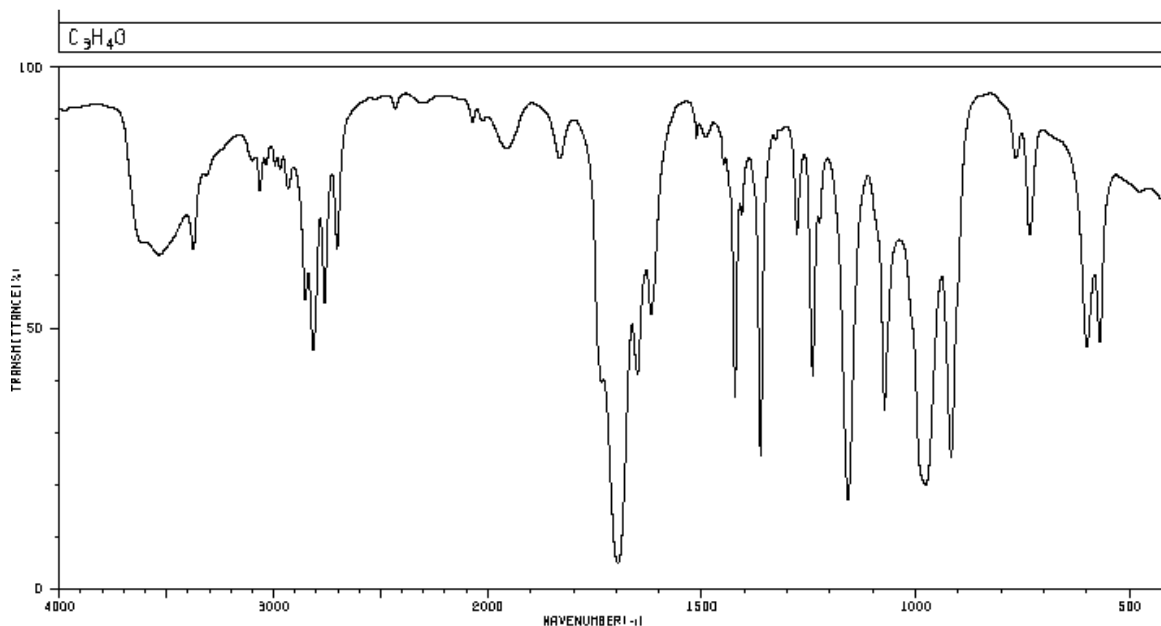


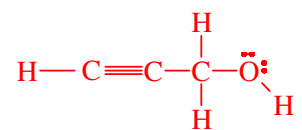
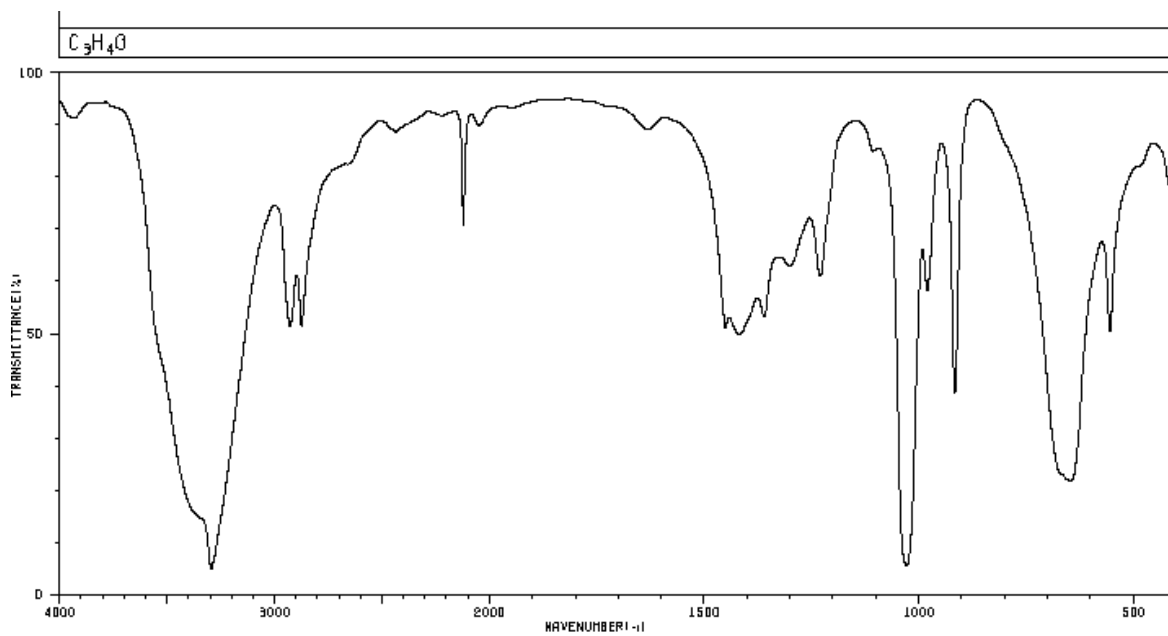
Quiz 1, due Oct. 2, 2007 at 6:30PM

Please be concise when answering the following questions on this paper or separate sheets of blank paper (stapled). Point values are in parentheses. Only turn in what is to be graded. You may use your text, notes and slides. You may not use the internet or any other person.

1.(12) Draw Lewis structures for two structural isomers of C_3H_4O that are consistent with the infrared spectra below. Use lines for bonds and show all nonbonding pairs of electrons. Identify the features in the spectra that verify your choices.

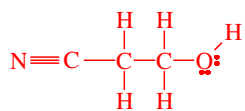


Strong $C=O$ stretch at 1700 cm^{-1} , $C=C$ stretch at 1650 cm^{-1} , aldehyde $C-H$ stretch at 2700 cm^{-1}

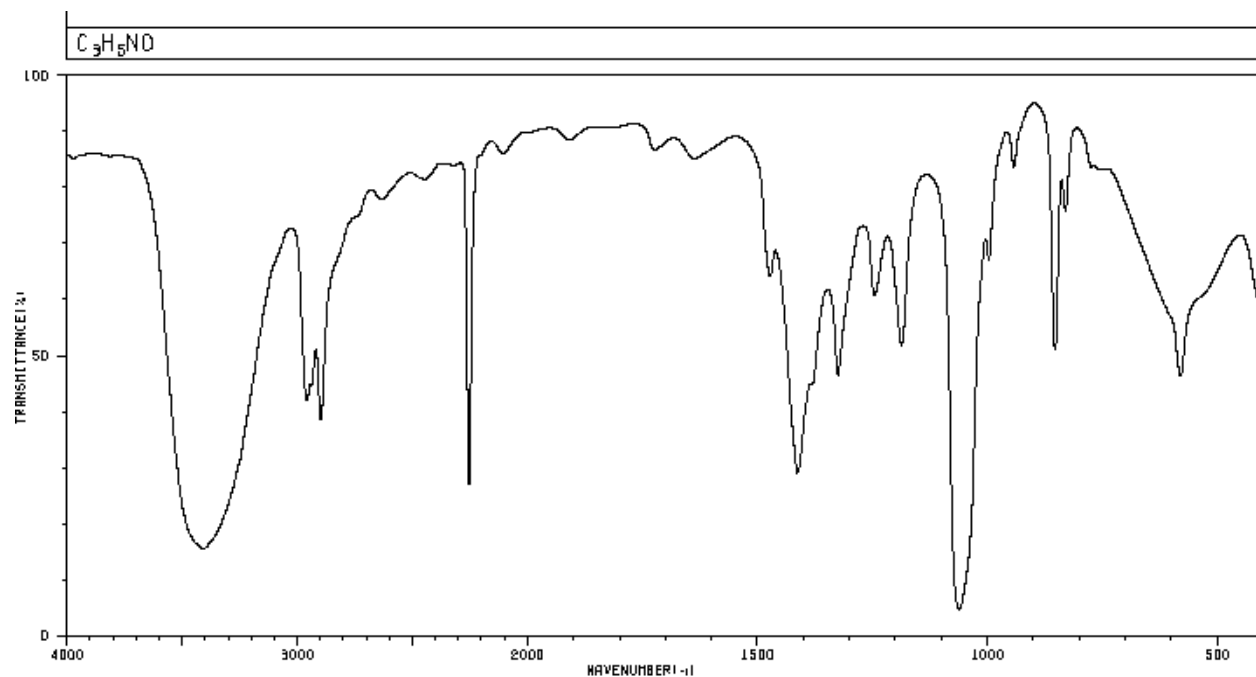


C-C triple bond stretch at 2150 cm^{-1} , sp C-H stretch at 3300 cm^{-1} (spike), broad O-H stretch at 3300 cm^{-1} , 1° C-O bend at 1030 cm^{-1}

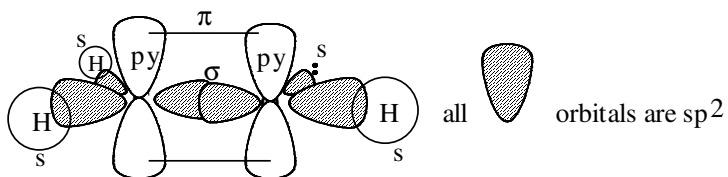
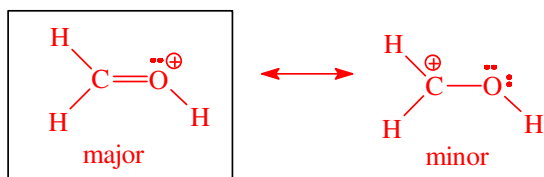
2.(10) Propose a Lewis structure of a compound (C_3H_5NO) that gives rise to the IR spectrum below. Indicate three absorptions in the spectrum that validate your structure (e.g. 1700, carbonyl stretch).



OH str. At 3400, CN triple bond str at 2250 (strong peak, large dipole change),
 1° C-O str at 1050 cm^{-1}

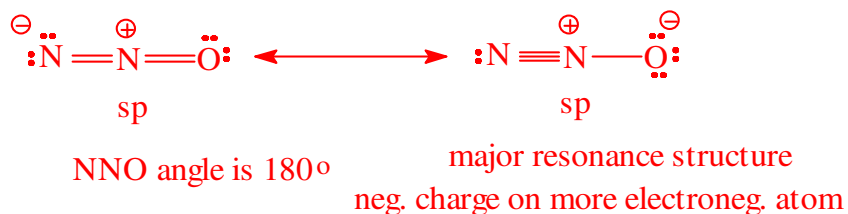


3.(12) Draw a **Lewis structure** and an **orbital representation** of the major contributing resonance form of $[CH_3O]^+$. In the latter depiction, label the orbitals (e.g. sp^3 , p_y) and bonds (e.g. σ , π).



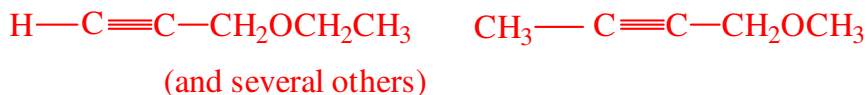
4.(12) Draw two contributing resonance forms (Lewis-dot structures) of N₂O (nitrous oxide or laughing gas). The molecule is not cyclic. Use lines for covalent bonds, show non-bonding pairs of electrons and indicate formal charges where appropriate.

- What is the hybridization of the central atom?
- What is the bond angle in this molecule?
- Which resonance structure is the major contributing structure? Briefly explain.

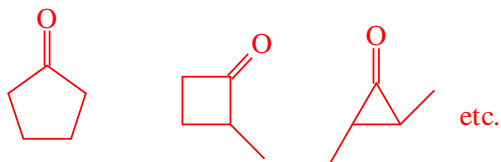


5.(12) Consider the formula C₅H₈O. Propose three different structures with the following characteristics (only need one each; I'm suggesting several):

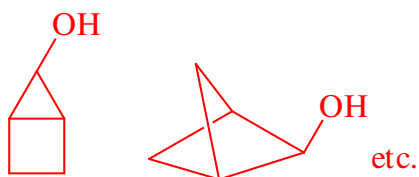
- a non-cyclic ether with no sp² orbitals.



- A ketone with no π bond other than the carbonyl.



- An alcohol with no π bonds.



6.(12) Identify and name the functional groups in the following compounds:

Anything in parentheses is optional. Arene or benzene is fine.

Serotonin has a phenol (arene), amine (secondary), alkene, and amine (primary).

Atropine has an arene, alcohol (primary), ester, and amine (secondary)

Tamoxifen has three arenes, alkene, ether, amine (tertiary)

