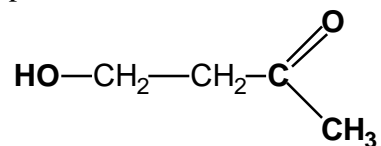


Problem Set #3
CH241-2001F

- [1] Propose structures for the following puzzles.
- A compound of the formula C_5H_8 that has only two types of carbons.
 - A compound of the formula $C_4H_8O_2$ in which all the carbons are equivalent.
 - A ketone of the formula $C_6H_{12}O$ that contains a tertiary carbon.
 - An aldehyde of the formula $C_5H_{10}O$ that has a quaternary carbon.
 - A compound of the formula C_3H_9N that can only be a hydrogen bond acceptor. Provide another structure with the same formula that can be a hydrogen bond donor as well as acceptor. Which one of these two structures would you expect to have the higher boiling point?
 - All alcohols of the formula $C_4H_{10}O$. Which one of these would be the most soluble in water?
 - All alkenes that may be hydrogenated to afford 1-methylcyclopentane. Which one of these is the most stable alkene?
 - Any alkene that would be “*cis*” according to *cis-trans* nomenclature and “*E*” under the *E-Z* system.

- [2] Consider the following compound:



- Looking down the bond connecting the two CH_2 groups, draw a Newman projection for the anti conformer (dihedral angle of 180° between OH and COCH_3).
 - Now draw a gauche conformer (dihedral angle of 60° between OH and COCH_3 groups).
 - Explain why, in this particular compound, the gauche conformer is more stable than the anti conformer.
- [3] One of the two reactions shown below is quite common in organic chemistry. By contrast, no examples exist for the other reaction. Using molecular orbital arguments, explain which reaction is favored and why.

