

Name: _____

Organic Chemistry - CHEM 231A

Test #1

September 23, 2001

1. Consider the following molecules. For each molecule, draw the molecule as a bond-line structure. Pay close attention to the correct structure of the molecule. (15 Points):

a. 4-*sec*-butyl-3,5-diethyl-6-isopropyl-2,2,7-trimethylnonane

b. $[\text{H}_3\text{CC}(\text{O})\text{CHCHCH}(\text{CH}_3)_2]^{-1}$

c. $\text{C}_6\text{H}_5\text{C}(\text{CH}_3)\text{C}(\text{CH}_3\text{CH}_2)\text{C}(\text{O})\text{CCH}$

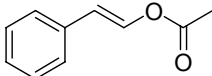
2 Consider the following questions: (25 points)

2a. What is a dipole moment? Explain why it exists (3 pts).

2b. Redraw each molecule and draw bond dipole moments for each. Include any appropriate charges or partial charges, as necessary. Resonance structures are NOT required. Explain briefly what the dipole means in regards to the reactivity of the molecule (4 pts each).

2b1. CH_3OH

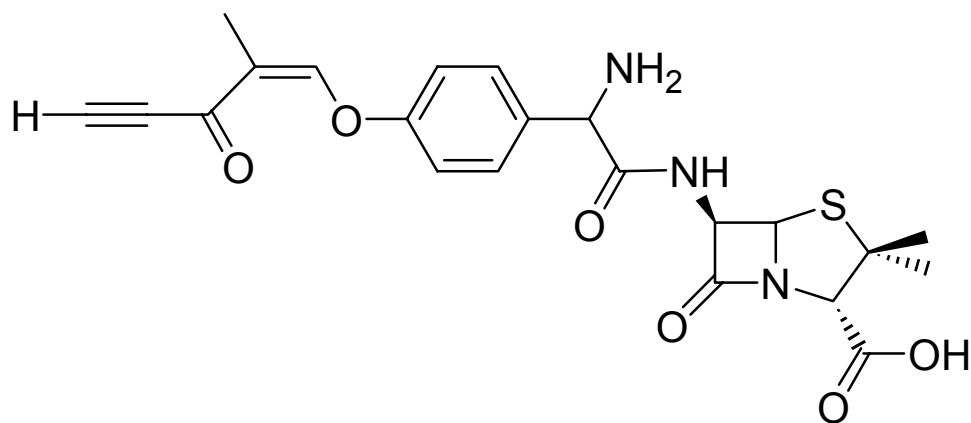
2b2. CH_3CHO

2b3. 

2c. What is a definition of a chemical reaction (as mentioned in class)? (4 pts)

2d. Using the molecules from 2b1 & 2b2, your dipole moments and your definition of a chemical reaction, predict a reaction that might occur between these two molecules. Draw the reactants and the products that might result from a reaction. Explain your answer and use the arrow formalism to depict a possible mechanism for the reaction. (6 pts)

3. Consider the following derivative of the anti-biotic, amoxicillin: (20 Points)



3a. Label the hybridization for at least 10 non-hydrogen atoms (10 pts).

3b. Circle and label all functional groups (10 pts).

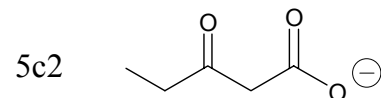
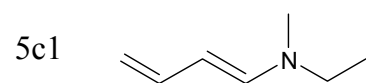
4. Consider the molecule propene, CH_2CHCH_3 . (30 Points)
- 4a. Draw the lewis dot and bond-line drawing of propene. What is the hybridization of each atom in propene? (5 pts)
- 4b. What is hybridization and why do we use it? (5 pts)
- 4c. Explain where hybridized orbitals come from. (8 pts)
- 4d. What is the shape of propene? Draw a picture that represents this shape. (7 pts)
- 4e. Explain why propene is this shape. (5 points)

5. Consider the following questions and molecules: (30 points)

5a. What are resonance structures? (4 pts)

5b. Why do we care about resonance structures? (6 pts)

5c. Draw the valid and reasonable resonance structures for each of the following molecules. Use the curved arrow formalism to show the relationships between structures. Include a depiction of all non-zero formal charges. (8 pts each)



5d. If the molecule in 5C2 is heated, carbon dioxide will be released and a new product will be formed. What is the structure of the new product? Draw the reaction and use a curved arrow formalism to show a possible mechanism for this reaction. (hint: What is the lewis dot structure of carbon dioxide? What does that mean the structure of the product must be? No electrons are lost from the reaction) (4 pts)