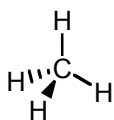


Chemistry 30A Discussion – Week 2: Structure / Resonance / Conformation – DCF

I: Structure

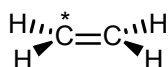
1.



For methane, shown at left:

- a) What is the hybridization of C? _____
- b) What is the HCH bond angle? _____
- c) What is the geometry of methane? _____

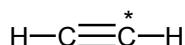
2.



For ethene, shown at left:

- a) What is the hybridization of C? _____
- b) What is the CCH bond angle? _____
- c) What is the geometry of C*? _____

3.



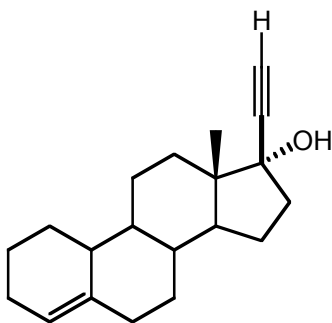
For ethyne, shown at left:

- a) What is the hybridization of C? _____
- b) What is the CCH bond angle? _____
- c) What is the geometry of C*? _____

4. For ethene, shown in question 2, there are two types of bonds that together make up the carbon-carbon double bond. (Fill in the blanks).

One is a _____ bond, which is made by two overlapping _____ orbitals and the other is a _____ bond, which is made by two overlapping _____ orbitals.

5. Lynestrenol (shown below) is a component of several oral contraceptives.

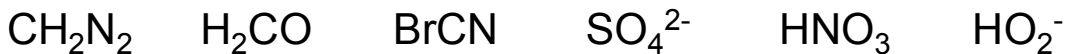


Lynestrenol

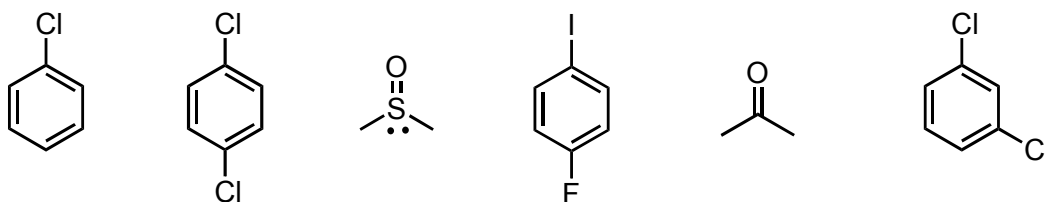
Identify on the molecule:

- a) 2 sp^3 hybridized atoms
- b) 2 sp^2 hybridized atoms
- c) 2 sp hybridized atoms
- d) A highly polarized bond
- e) A bond between two atoms of different hybridizations

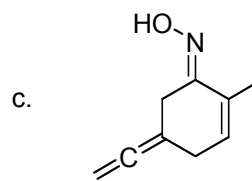
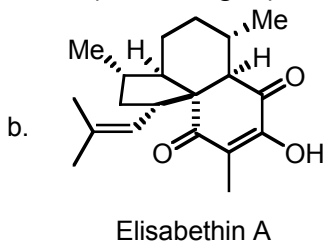
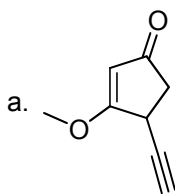
6. Draw the best Lewis Structure for each of the following compounds (be sure to assign formal charges to each atom, as needed).



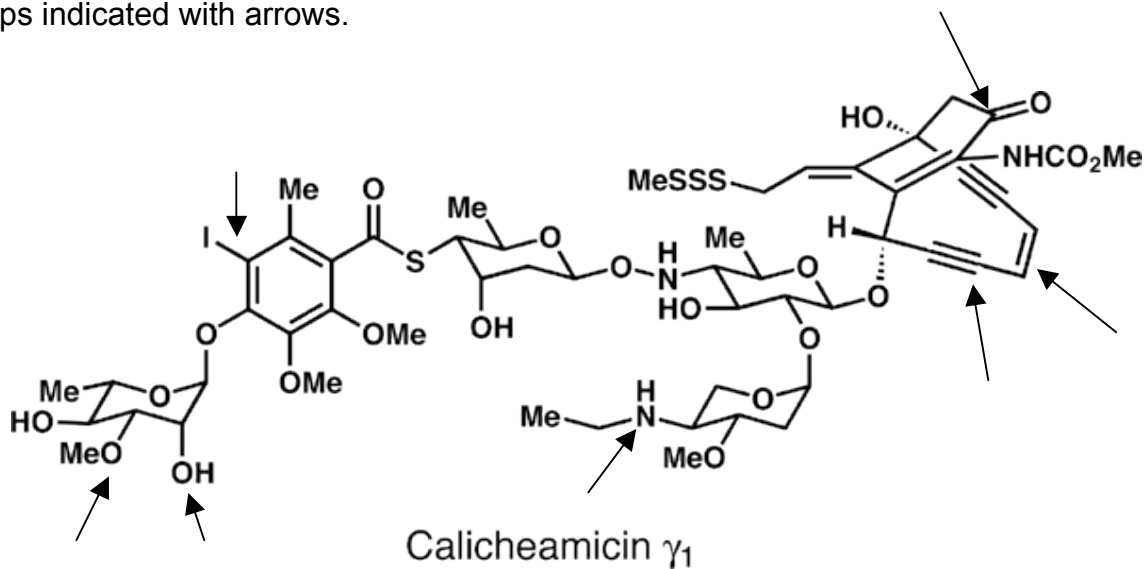
7. Use ($\text{+} \longrightarrow$) to indicate the net dipole of each of the following structures.



8. Identify the hybridization of every atom (excluding H) in the compounds below.

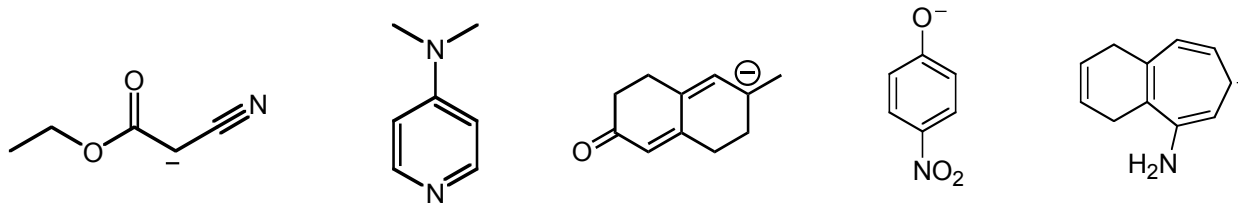


9. Calicheamicin γ_1 is a very powerful anti-tumor agent. The total synthesis of this complex natural product was first completed by K.C. Nicolaou in 1992. Please identify the functional groups indicated with arrows.

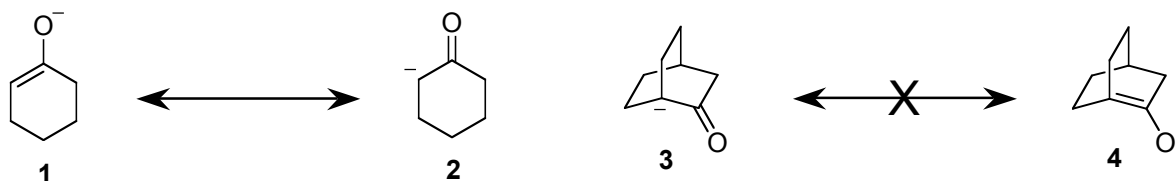


II: Resonance

10. Draw all possible resonance structures of the molecules below using proper arrow notation including curved arrows to show movement of electrons. Indicate with a star the resonance structure(s) which you believe contributes the most to the actual structure.

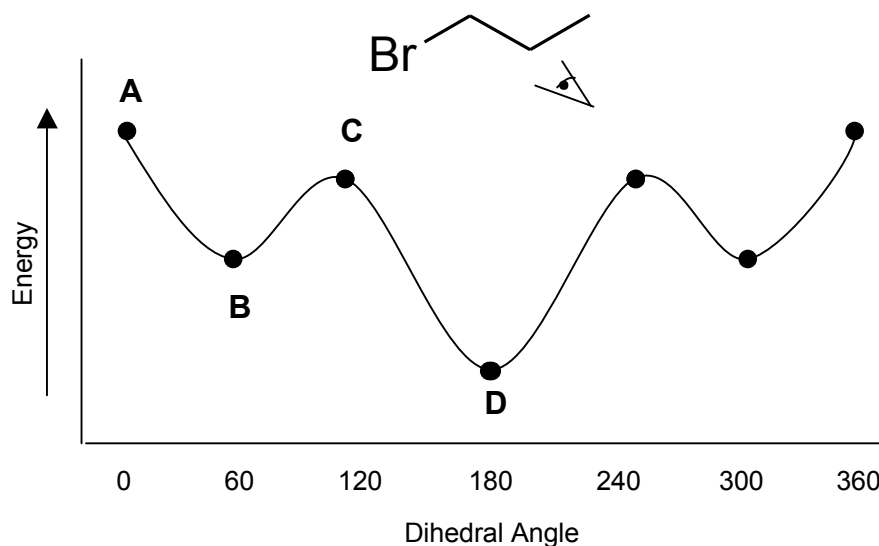


11. Draw pictures to show why compound **2** is a valid resonance structure of **1**, while **4** is not a valid resonance structure of **3**. (Hint: draw the relevant molecular orbitals).

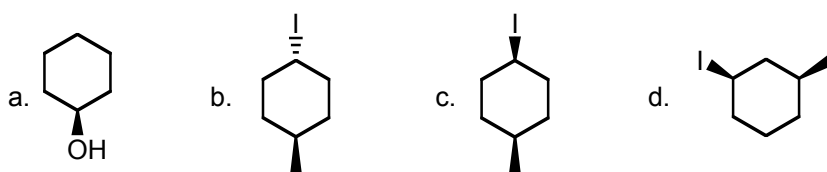


III: Conformation

12. Draw the Newman projections (A-D) of 1-bromopropane corresponding the energy diagram below. In each case explain the relative energy of the conformation.



13. Draw the both chair forms for each molecule. Identify the lower energy chair of each pair and calculate the approximate ΔG .



<u>R</u>	<u>A value</u>
-CH ₃	7.5
-I	2.0