Organic Chemistry for Life Sciences: CHM 223 Section A Problem Set Chapter 1

Name_

DUE: Wednesday September 6

1. What is the charge on a carbon atom that has the same number of valence electrons as a neutral oxygen atom? Draw its *complete* Lewis dot structure. •a neutral oxygen atom has six valence electrons

· ċ· -2

• a neutral oxygen atom has six valence electrons
• a neutral carbon atom has 4 valence electrons
• a carbon with six valence electrons would have two electrons more than usual, and therefore have a -2 charge

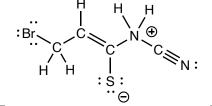
2. Which of the following bonds places the most partial negative charge on the carbon atom?

A. C-BB. C-NC. C-OD. C-F
$$\delta - \delta +$$
 $\delta + \delta \delta + \delta \delta + \delta -$

 carbon will have a partial negative charge only if it is bonded to a LESS electronegative atom

3. Draw the *complete* Lewis dot structure for methoxide ion: $[H_3CO]^{-1}$



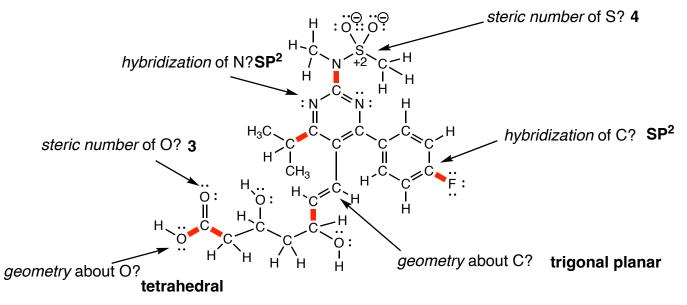


5. What molecule containing only 1 carbon atom and an appropriate number of hydrogen atoms has a **negative** charge and a **tetrahedral** geometry?



A negatively charged carbon would look like an oxygen atom with three bonds (to H's) and one lone pair. With a steric number of 4 it would have a tetrahedral geometry

6. Crestor is a medication launched in 2003 by AstraZeneca to treat high cholesterol. Fill in the desired information for Crestor's chemical structure as indicated below:



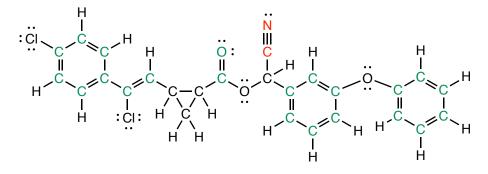
7. How many sigma bonds in Crestor are formed via overlap of an SP² hybridized orbital of one atom with an SP³ hybridized orbital of another?

6 bonds (highlighted in red in question 6)

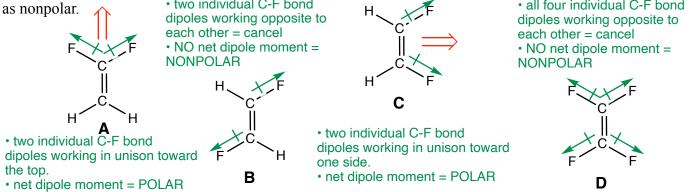
8. Flumethrin, shown below, is one of the compounds used as a flea and tick treatment on dogs.

i. How many atoms have SP² hybridization? 22 (highlighted in green)

ii. How many atoms have SP hybridization? 2 (highlighted in red)



9. Draw the individual bond dipoles and overall dipole moments for the compounds below, or designate them



10. After solving problem 9, Jimmy is confident that compound E will have a greater dipole moment than compound F. Is Jimmy correct? Briefly explain your findings (BIG HINT: use the CheMagic program to view the two isomeric compounds)

