



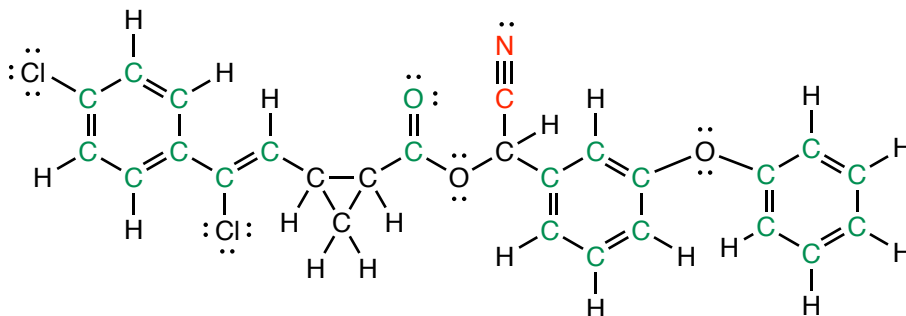
7. How many sigma bonds in Crestor are formed via overlap of an  $SP^2$  hybridized orbital of one atom with an  $SP^3$  hybridized orbital of another?

6 bonds (highlighted in red in question 6)

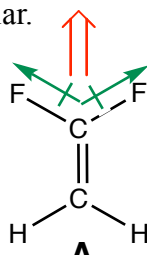
8. Flumethrin, shown below, is one of the compounds used as a flea and tick treatment on dogs.

i. How many atoms have  $SP^2$  hybridization? 22 (highlighted in green)

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

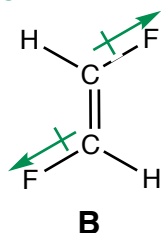


9. Draw the individual bond dipoles and overall dipole moments for the compounds below, or designate them as nonpolar.



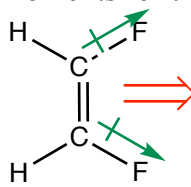
• two individual C-F bond dipoles working in unison toward the top.  
• net dipole moment = POLAR

• two individual C-F bond dipoles working opposite to each other = cancel  
• NO net dipole moment = NONPOLAR



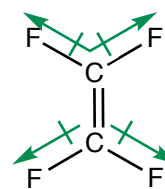
**B**

• two individual C-F bond dipoles working in unison toward one side.  
• net dipole moment = POLAR



**C**

• all four individual C-F bond dipoles working opposite to each other = cancel  
• NO net dipole moment = NONPOLAR

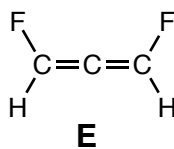


**D**

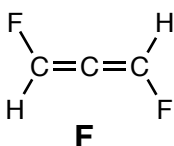
10. After solving problem 9, Jimmy is confident that compound E will have a greater dipole moment than compound F. Is Jimmy correct? Briefly explain your findings (BIG HINT: use the CheMagic program to view the two isomeric compounds)



Jimmy



**E**



**F**

• at first glance, it appears that the bond dipoles in F will cancel each other similar to what happens for A above, while those for E will be additive and lead to a dipole moment  
• however, because the central C atom is required to use both of its P-orbitals to form 2 different pi bonds, the two structures are actually identical to one another and will have the **same** dipole moment.  
• Sorry Jimmy!

