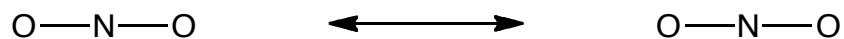


Question 2. a) On the template below, draw two valid Lewis structures for the nitrite ion, NO_2^{-1} that best represent the structure. Make sure to include all lone pairs and identify any non-zero formal charges.

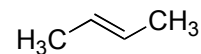
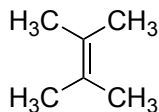
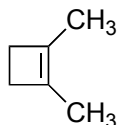


b) Add curved arrows (showing electron movement) to your structure on the left (above) that show how it can be converted into the structure on the right.

c) Add dipole arrows, where applicable, showing all polar bonds for the structure on the right, above.

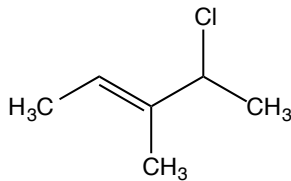
d) Is the nitrite ion polar? Why or why not? *A well-drawn picture is worth many words...*

Question 3. Circle the most stable π bond



Question 4. Draw gauche 1,2-difluoroethane (use any notation you wish that clearly depicts gauche 1,2-difluoroethane)

Question 5. Provide the complete IUPAC name for the following compound:

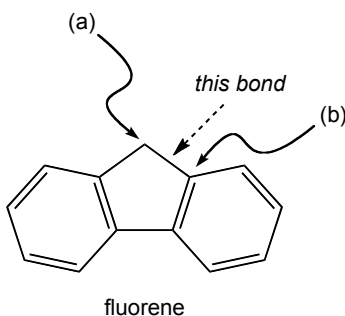


Question 6. a) Draw a Lewis structure (line notation is OK) for the compound 3-ethyl-3-methyl-pentane.

b) Draw a Newman projection of your structure from part (a) as viewed down the C₂-C₃ bond.

c) How many signals will appear in the ¹H NMR spectrum of 3-ethyl-3-methyl-pentane (in other words, how many hydrogen atom environments/types)?

Question 7. Consider the compound fluorene, one of the compounds from laboratory experiment 1.



a) Identify the hybridization states of the carbon atoms labeled (a) and (b).

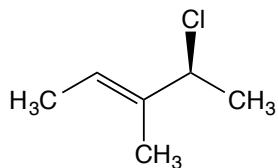
(a)

(b)

b) The bond between carbon atoms (a) and (b) is identified with a dashed arrow. Is this a sigma or a pi bond? What atomic orbitals on carbon atoms (a) and (b) overlap to make this bond?

c) When performing column chromatography (with silica gel as the solid phase – just like you did in lab with fluorene and fluorenone), is it true that using a polar solvent (eluant) will make polar compounds move through the column (elute) faster than non-polar compounds? Why or why not?

Question 8. The following questions refer to the compound shown below.



a) Assign *R* or *S* to all stereocenters. *Use the space below to show your work!*

b) Draw a diastereomer of the compound.

c) Draw the enantiomer of the compound.

d) The double bond in the compound can be removed as shown below by reaction with hydrogen gas and a metal catalyst. How many possible stereoisomers will result from this reaction? Remember that your starting material is the single enantiomer shown. Make sure to briefly explain how you arrived at your answer.

