

1. [30 points maximum] For each of the following, show your reasoning and/or your work.

(a) For each of the following functional groups, draw a *specific* example of a molecule having this group:

Alkyne

Amine

Aromatic

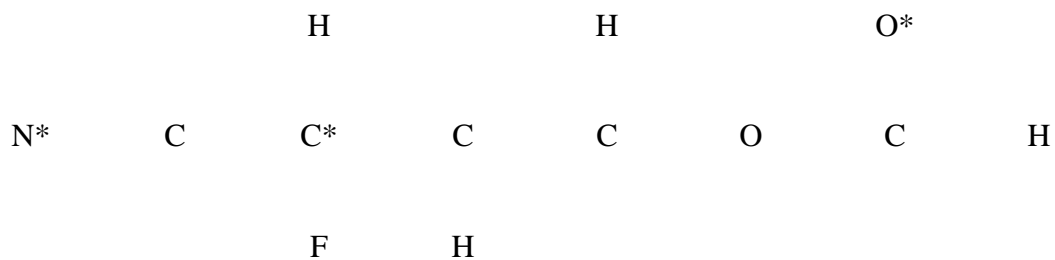
Ketone

Alcohol

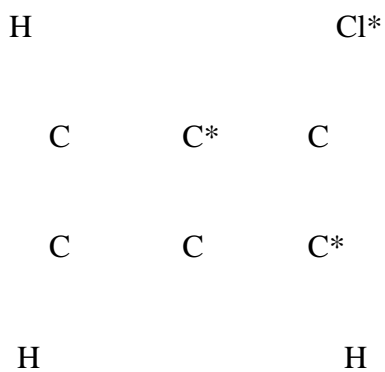
(b) Clearly describe the *structure* and the *bonding* of the carbon-carbon double bond in $\text{CH}_2=\text{CH}_2$. Include in this description a comparison of a carbon-carbon double bond to the carbon-carbon single bond in CH_3-CH_3 .

2. [30 points maximum] For each of the following molecules, draw the Lewis structure and check if your Lewis structure is correct. For each atom in these molecules, predict the bond lengths and angles. For the three atoms with stars (*) in each molecule, give their hybridizations.

(a)



(b)

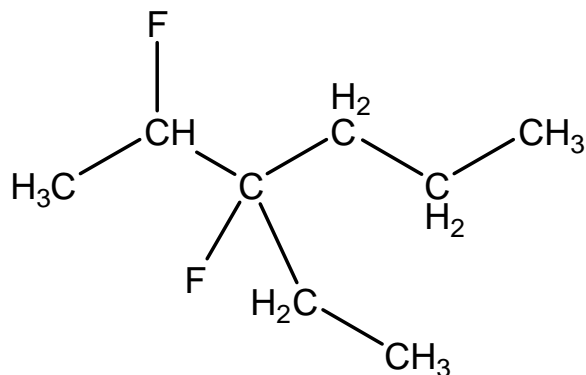


3. [30 points maximum] For each of following molecular formulae, draw 5 structural isomers. Be sure that you show **all** atoms and bonds for each.

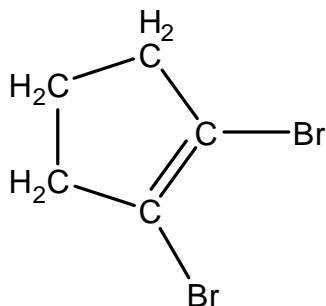


4. [60 points maximum] For each of the following structures or names, give an IUPAC name or draw the correct structure (including all atoms), as required.

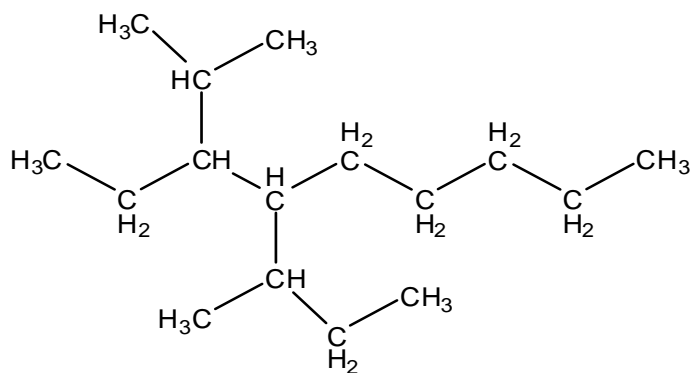
(a)



(b)



(c)



(d) 3,5-diethyl-3-octene

(e) 1,3-dimethylcycloheptane

(f) Valine