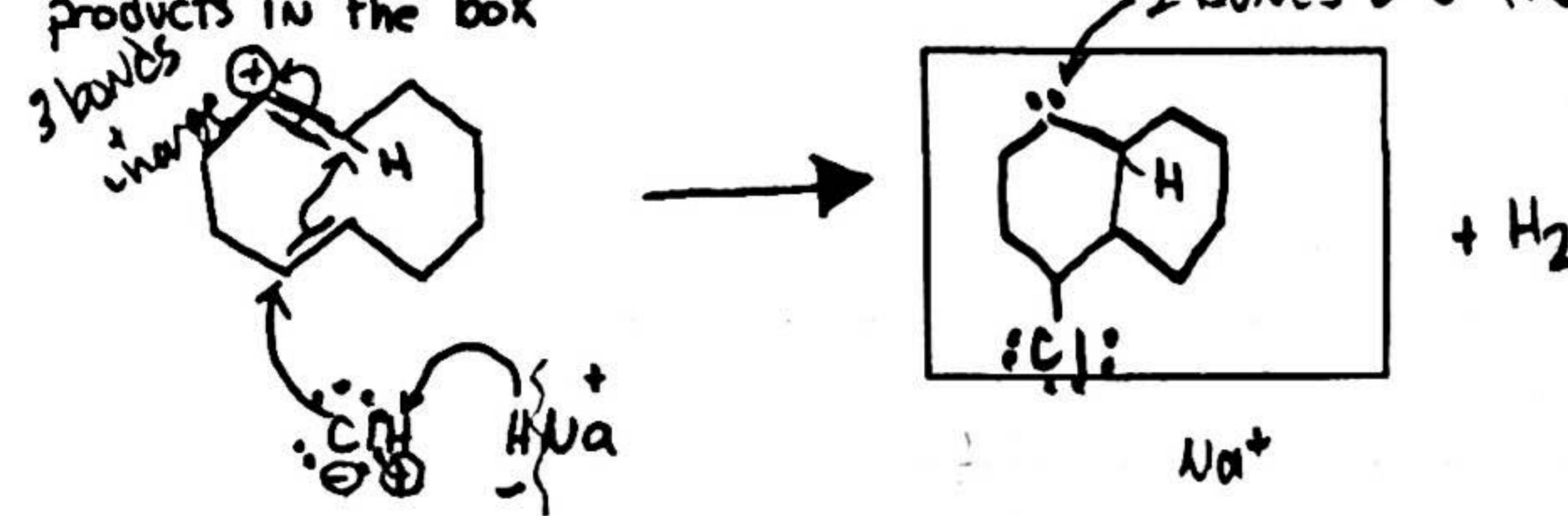


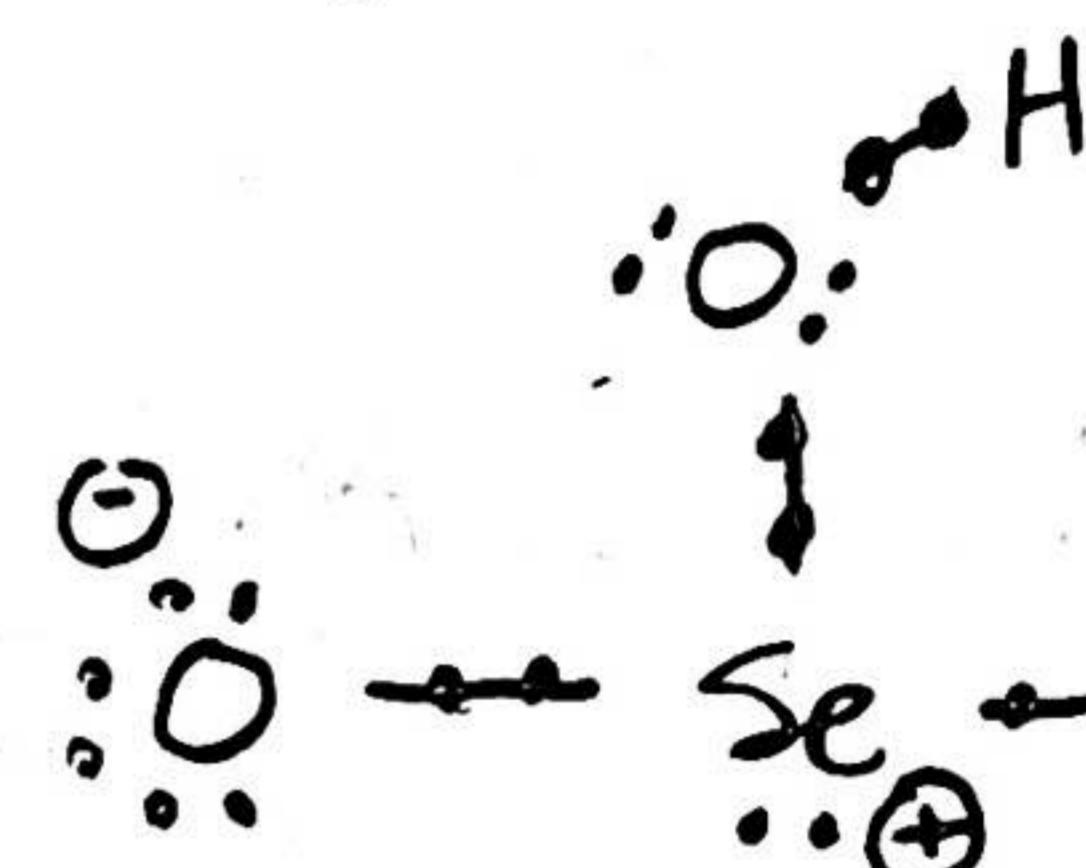
# SL mid-term review

October 3, 2021 3:38 PM

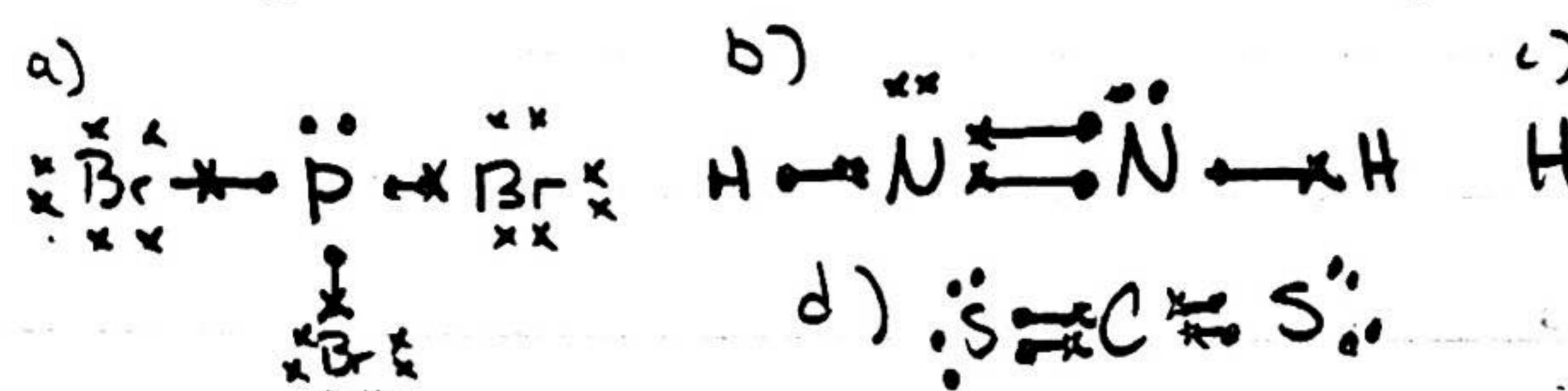
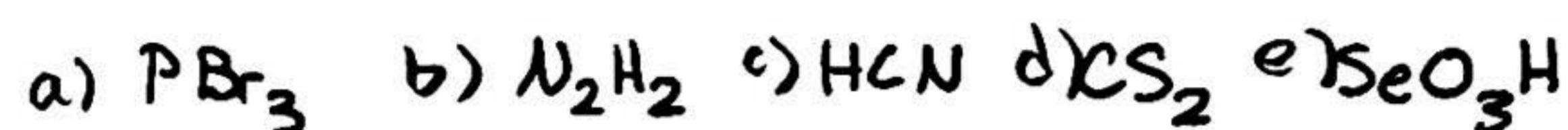
- 1) Follow the mechanistic electron flow arrows and write all products in the box



Remember 2 in 2 out.  
Formal charge formula = valence - (LP + 1/2 Bond) / e-

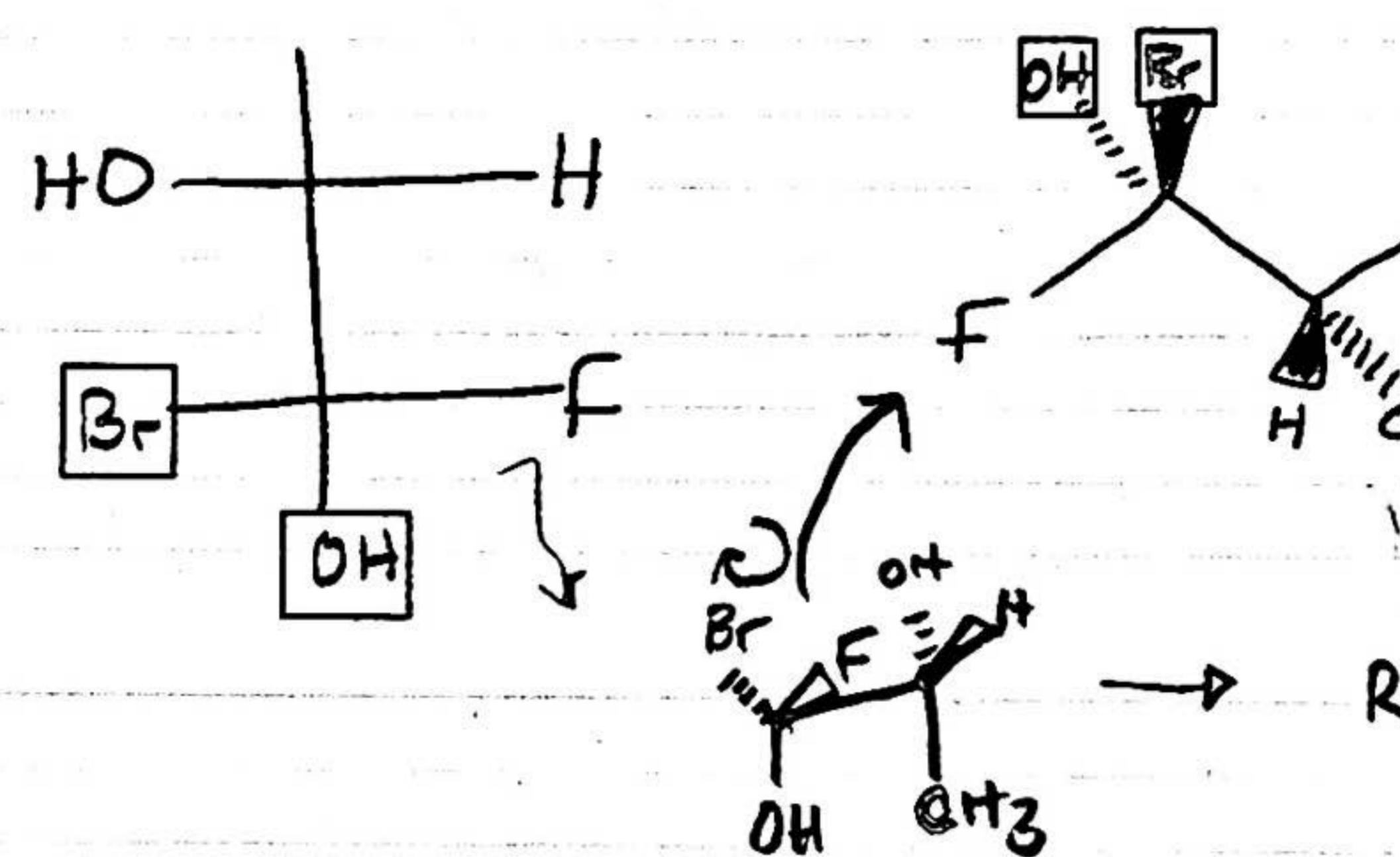
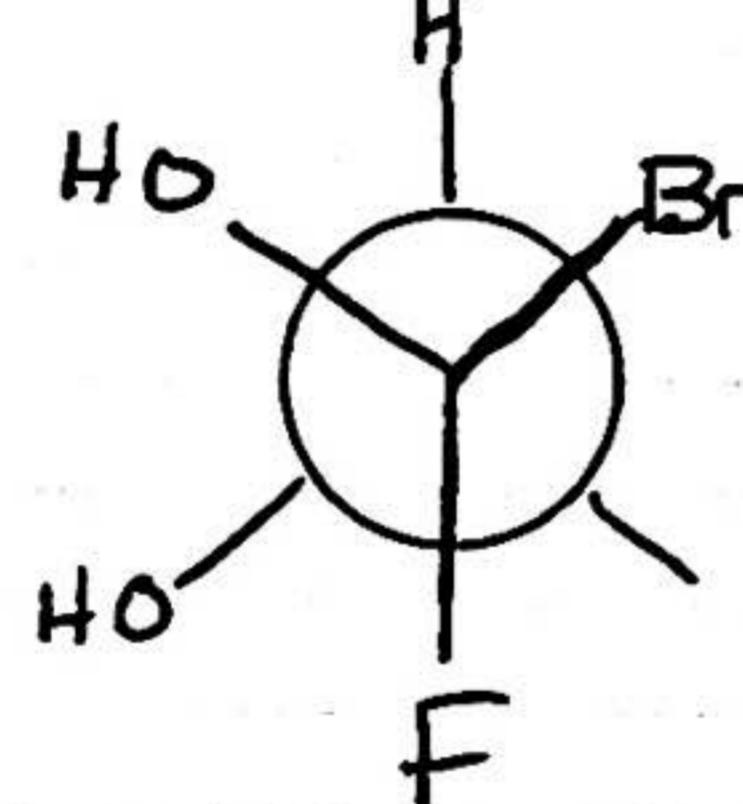


- 2) Draw Lewis structures for the following molecules



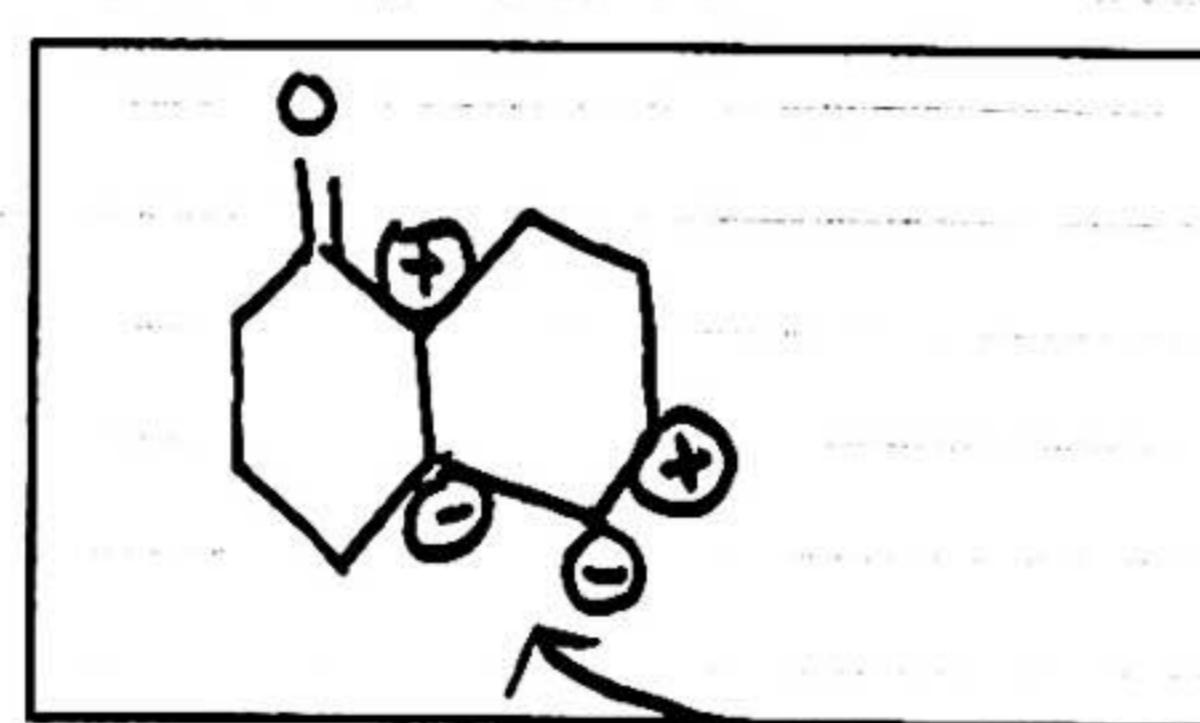
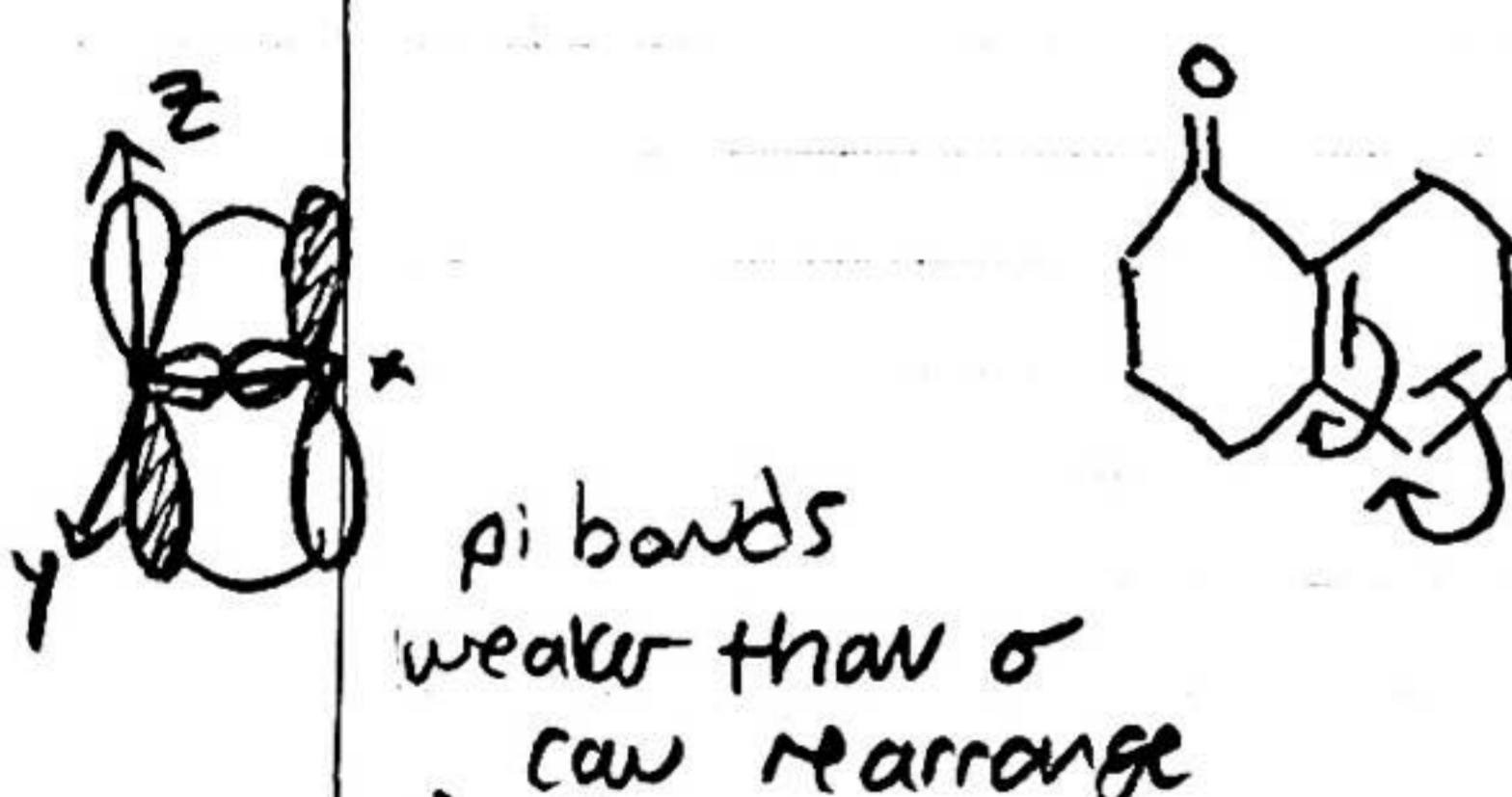
possible structure  
if all atoms were obeying  
the octet rule.

- 3) Fill in the boxes with the correct substituents. There is an error in the fencepost projection. Find it for bonus +1



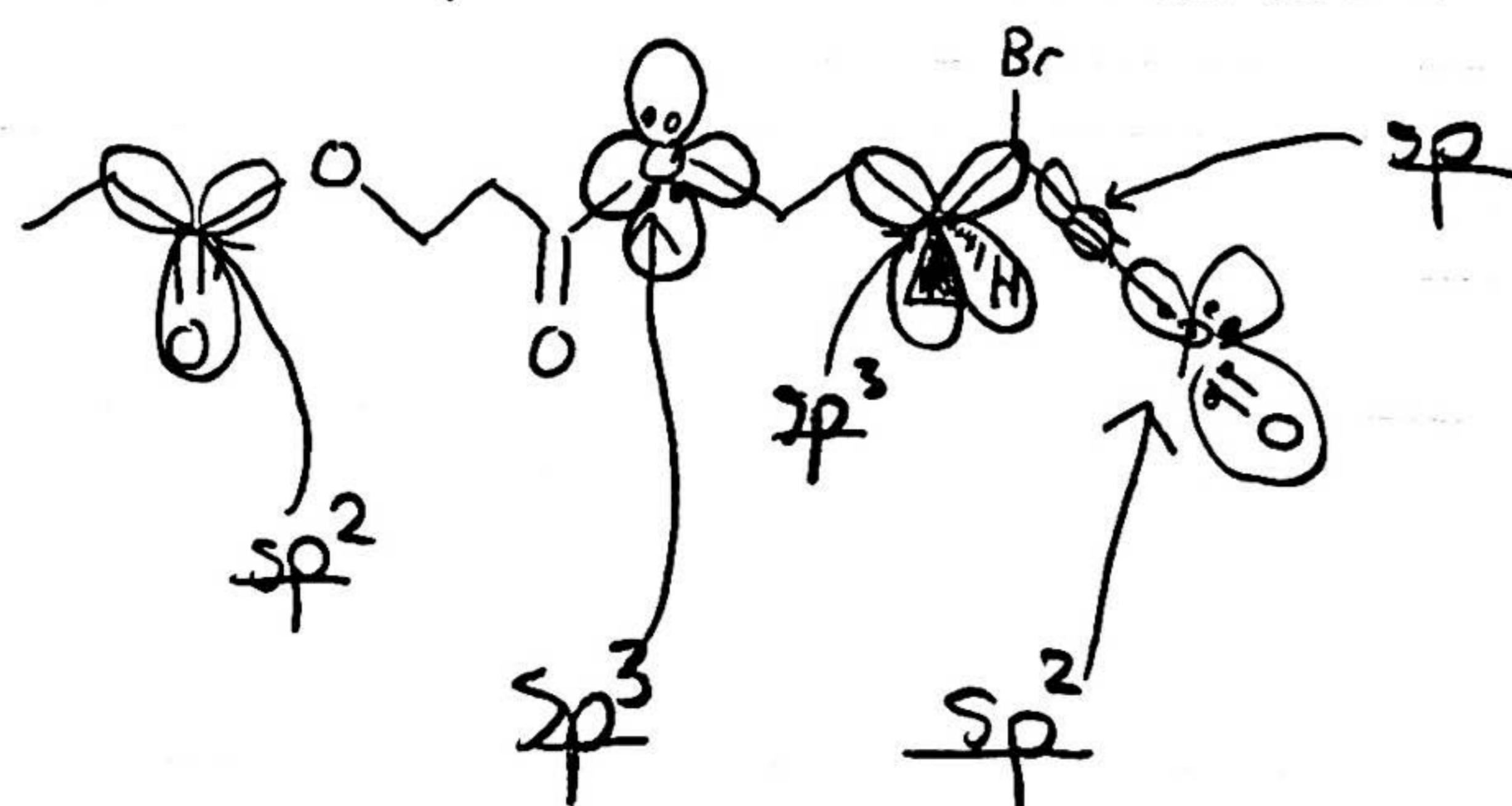
error they are flipped

- 4) Given the following molecule draw a multiple charged unstable resonance hybrid. Show arrows and explain why it is unstable.



could also argue  
as unstable.

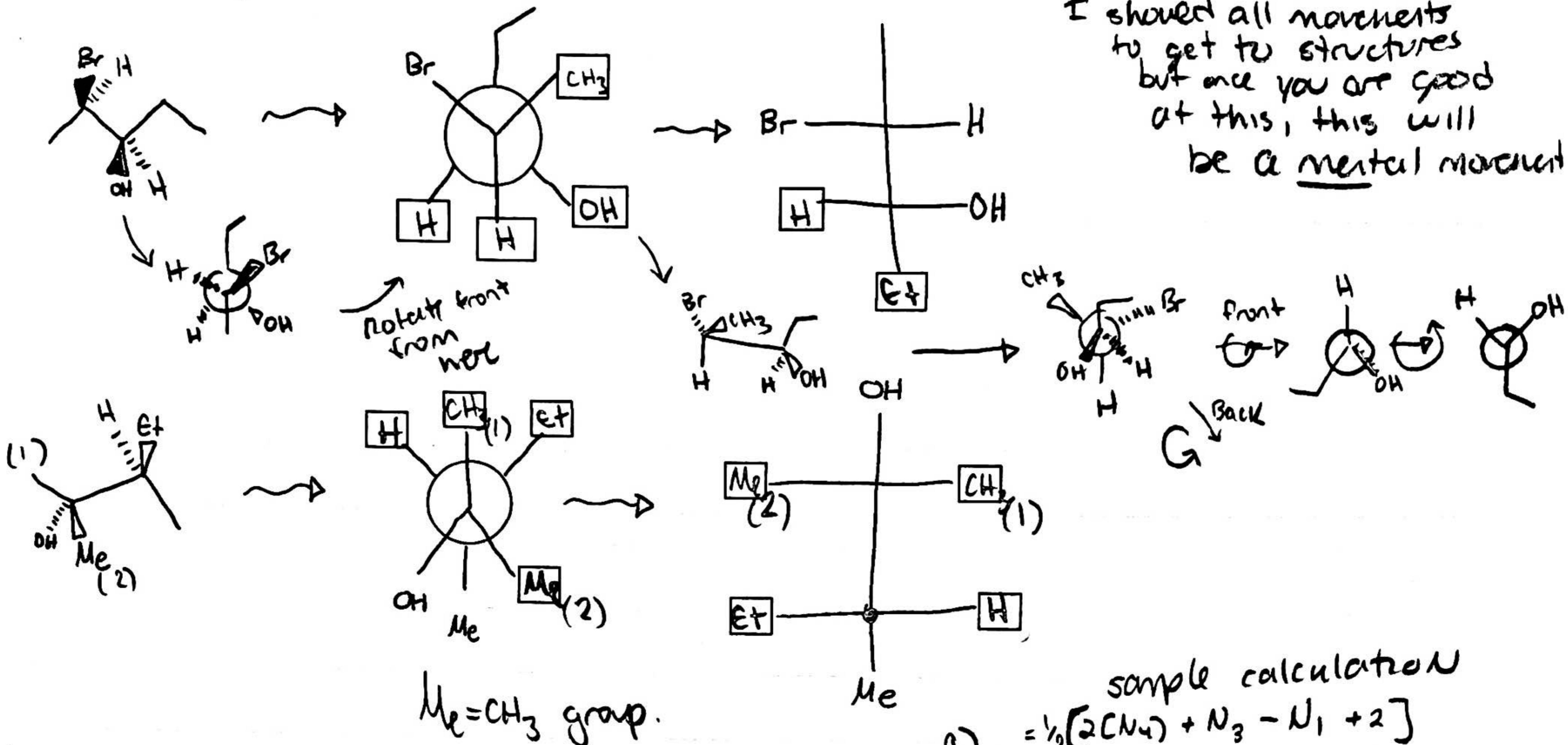
- 5) Determine the hybridization at the indicated atom's. Repulsion = unhappy



dash  
wedge  
#  
H  
wedge dash  
dash wedge

- 6) Consider the fencepost projection. fill in the boxes for its Newman

and fisher projections.



$\text{Me} = \text{CH}_3$  group.

sample calculation

$$a) = \frac{1}{2} [2(\text{N}_4) + \text{N}_3 - \text{N}_1 + 2]$$

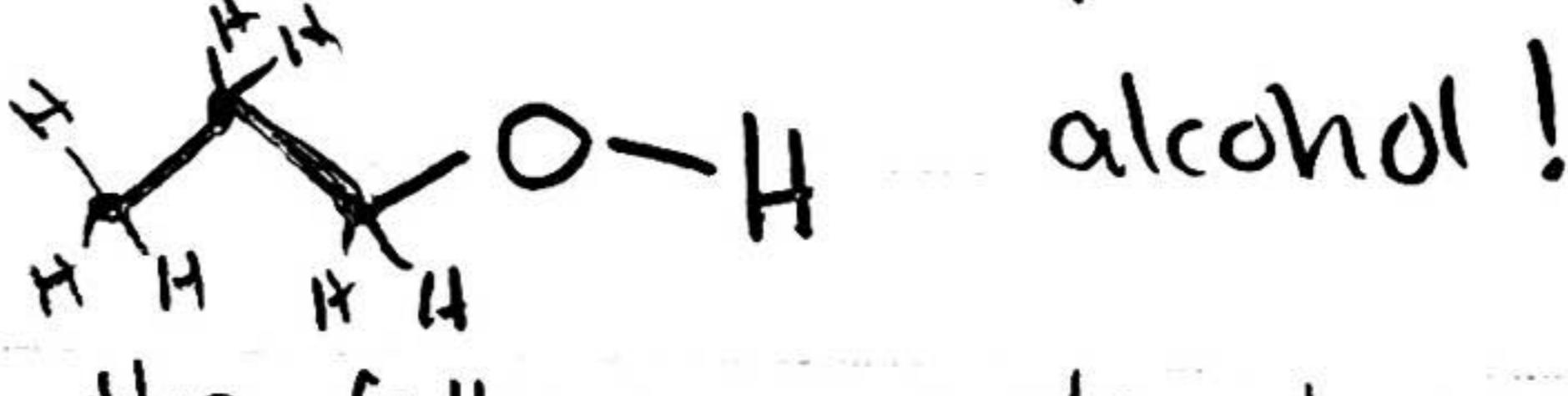
$$\text{DBE} = \frac{1}{2} [2(3) + 0 - 8 + 2]$$

$$= \frac{1}{2} [6 + 0 - 6] \\ = \frac{1}{2} [6 - 6] \Rightarrow 0$$

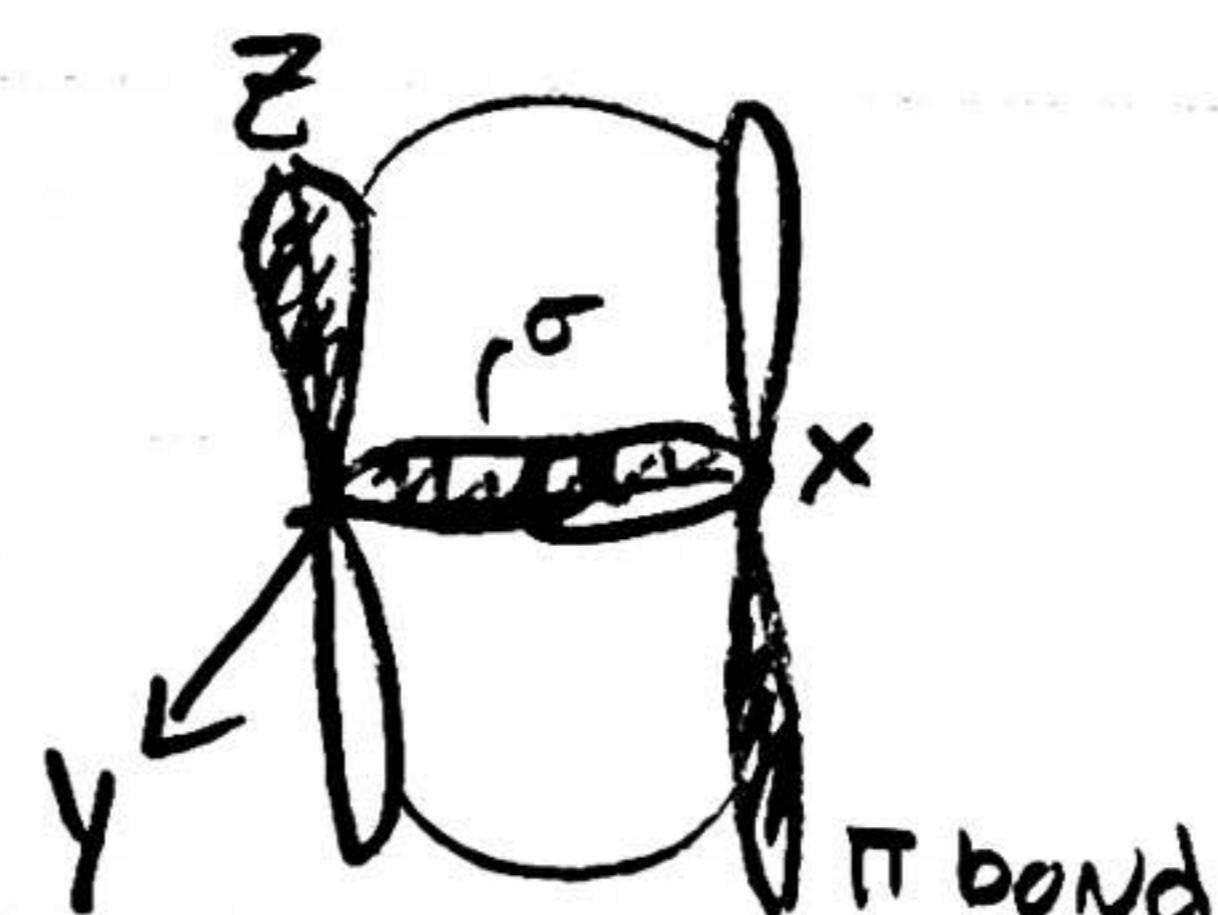
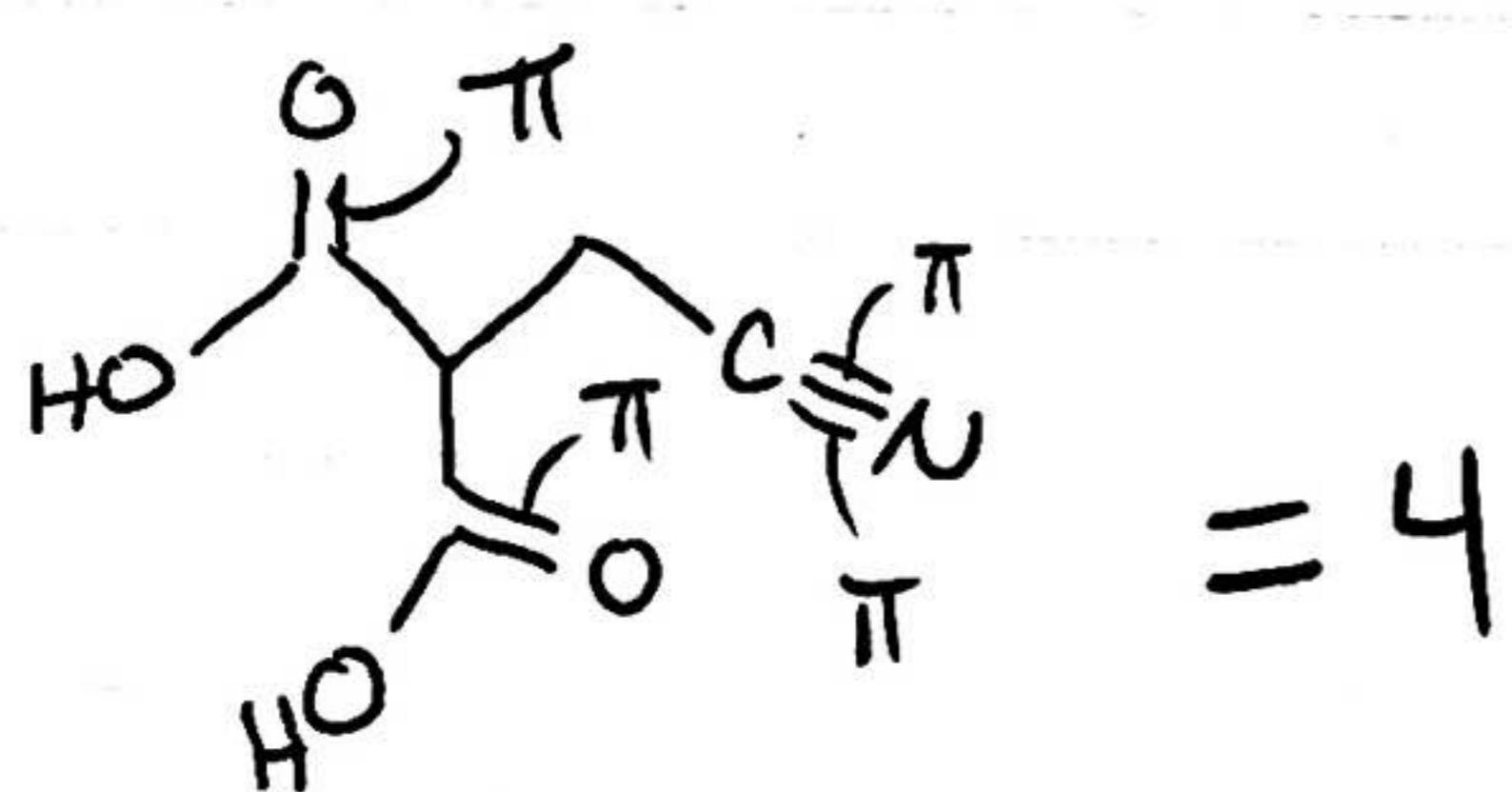
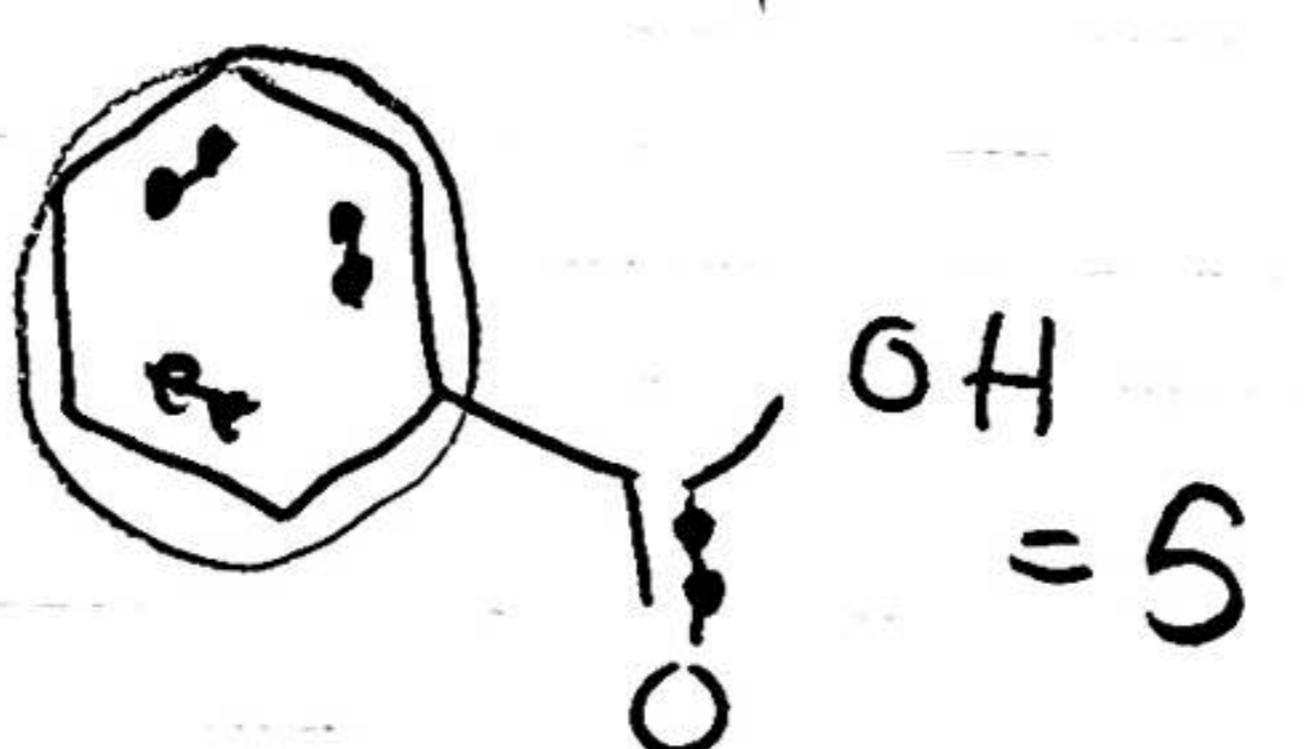
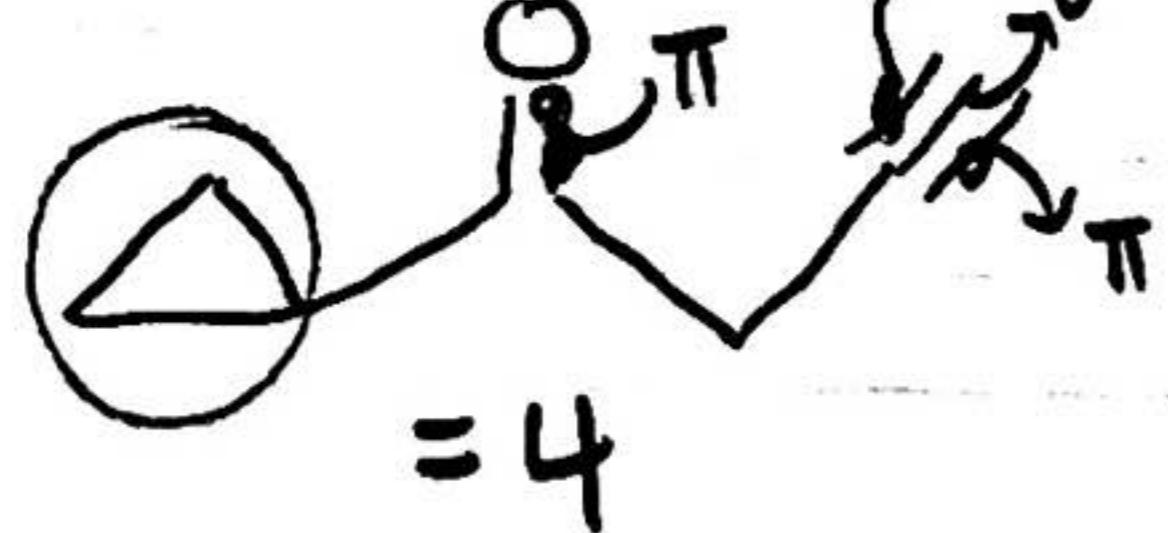
7) Calculate the DBE for the following



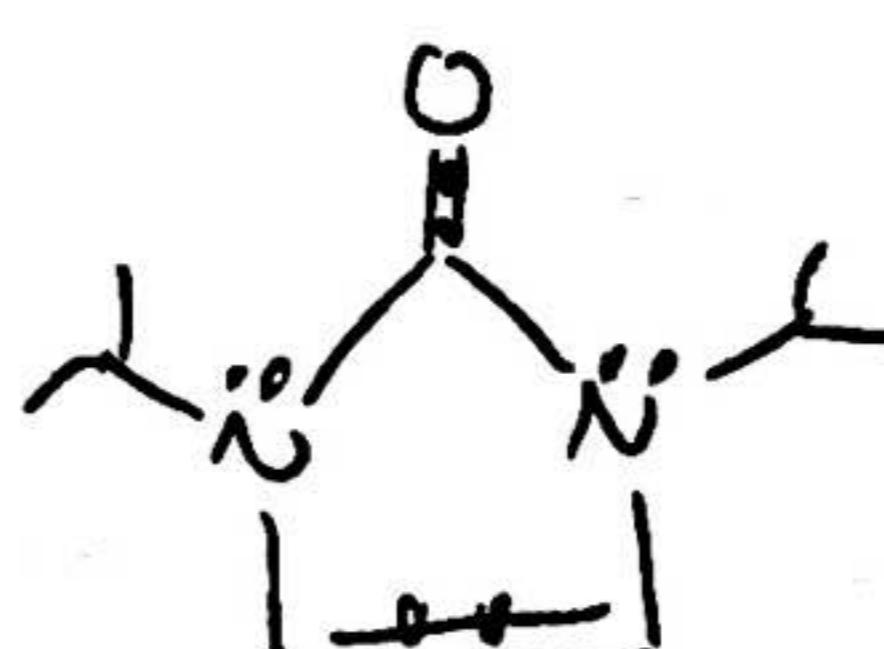
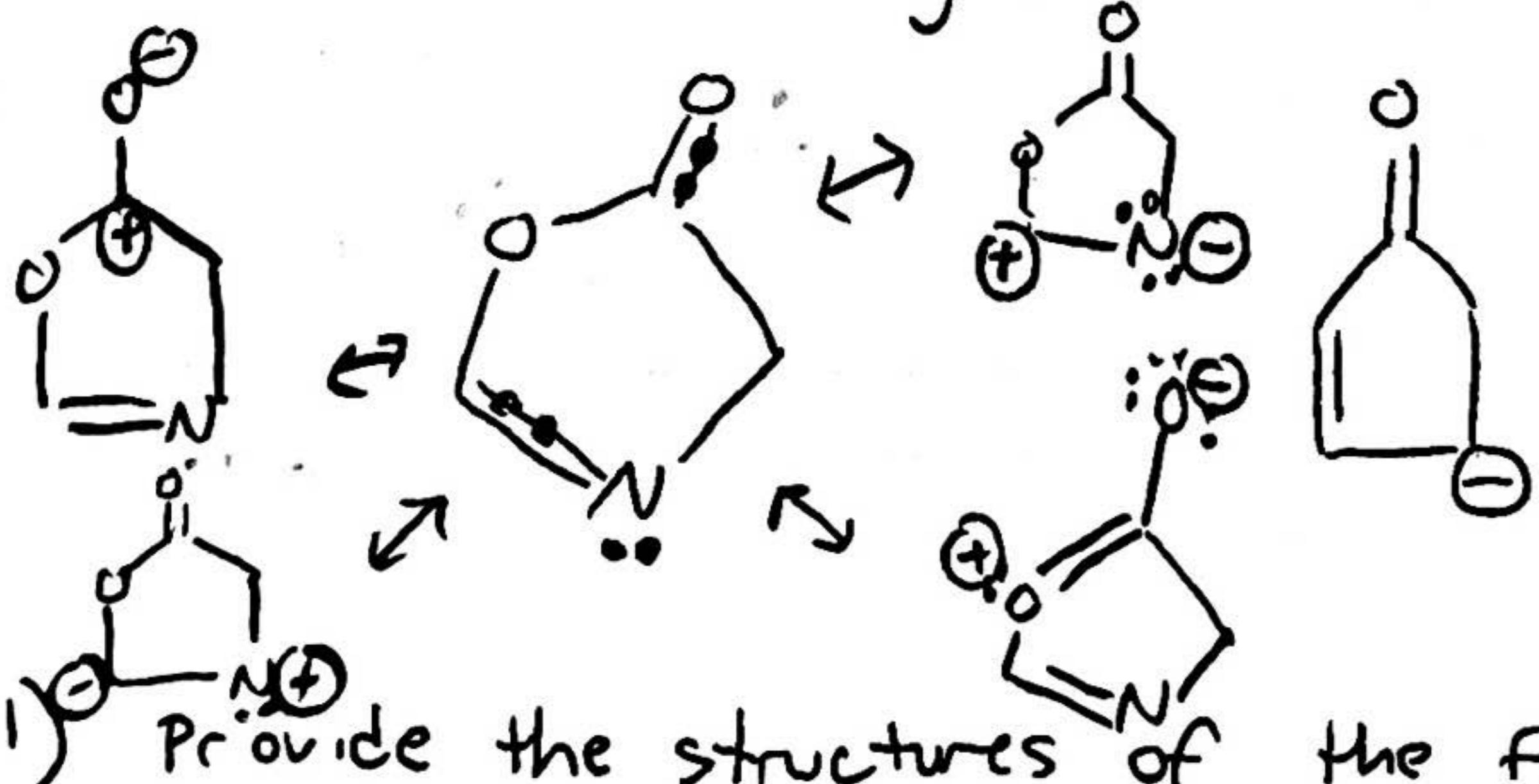
8) Propose a structure for  $\text{C}_3\text{H}_8\text{O}$  that corresponds with its DBE



9) what is the DBE of the following molecules



10) Draw as many potential resonance structures as you can for the following molecules.

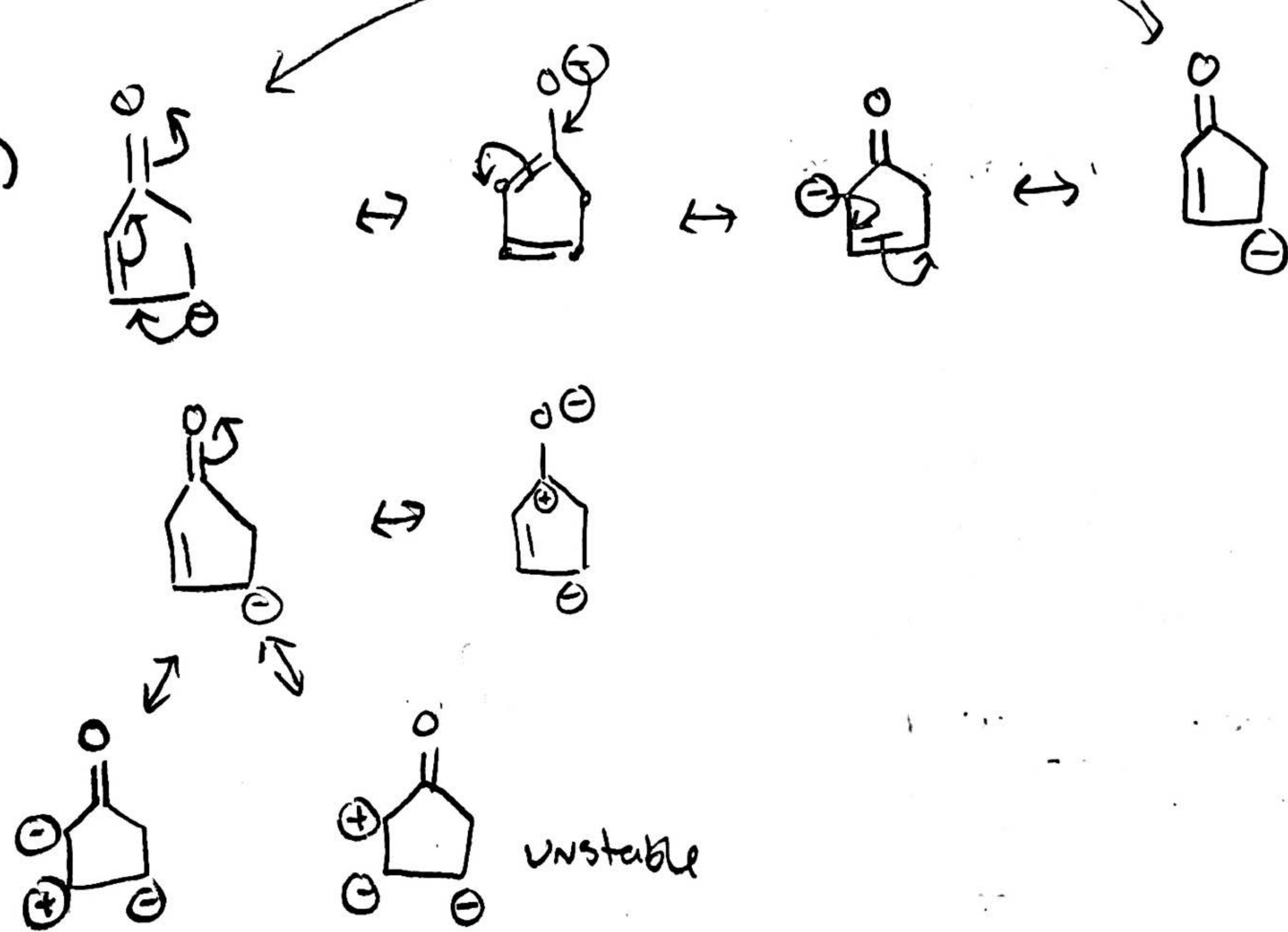


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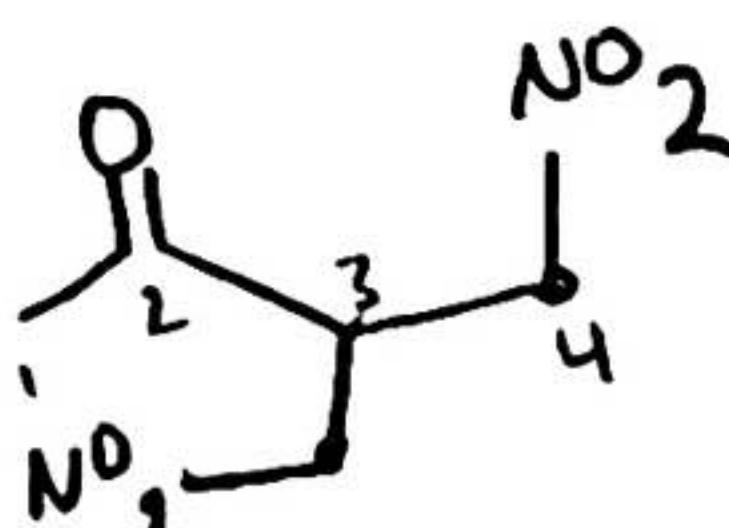
11) Provide the structures of the following IUPAC names

10)

Example:



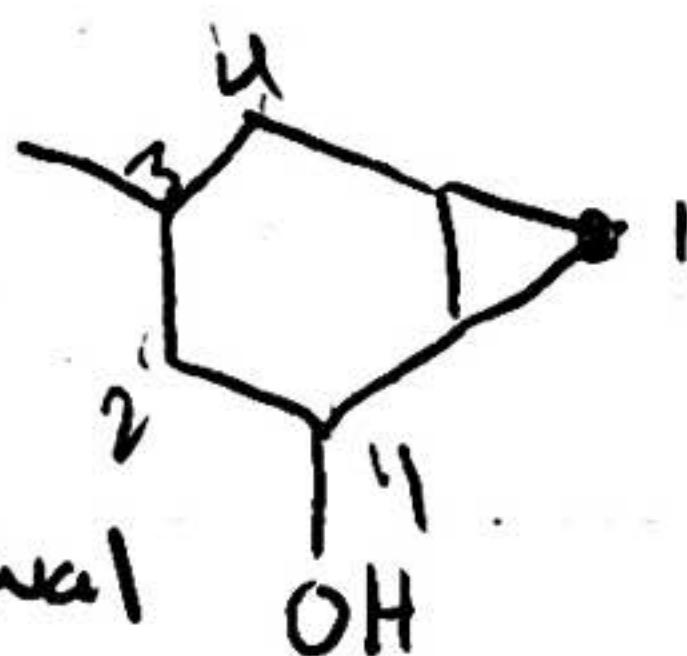
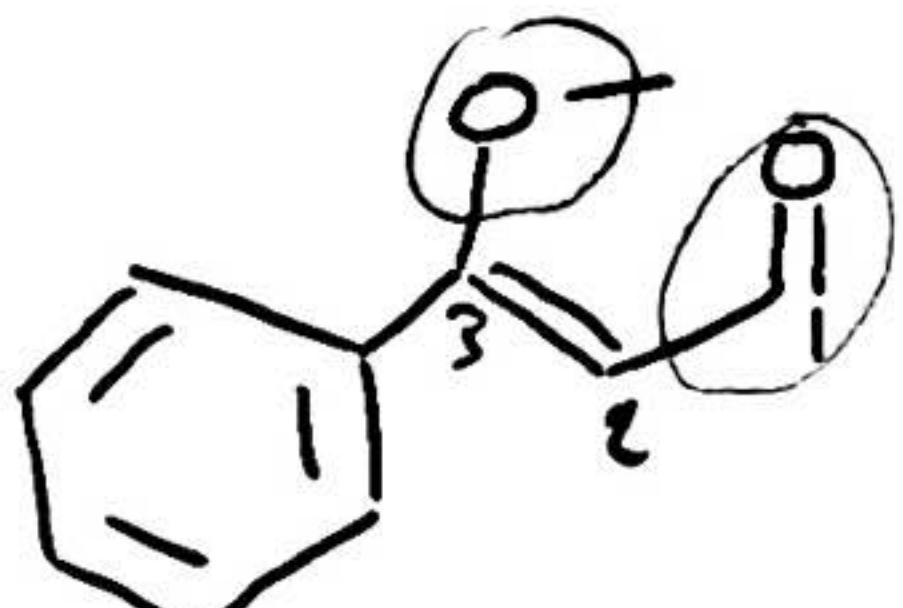
a) 4-nitro-3-(1-nitromethyl)butan-2-one



b) 1,16-dichloro-2-(1,2-dimethylbutyl)-10-(1,1-dimethylpropyl)hexadec-1(6)-ene

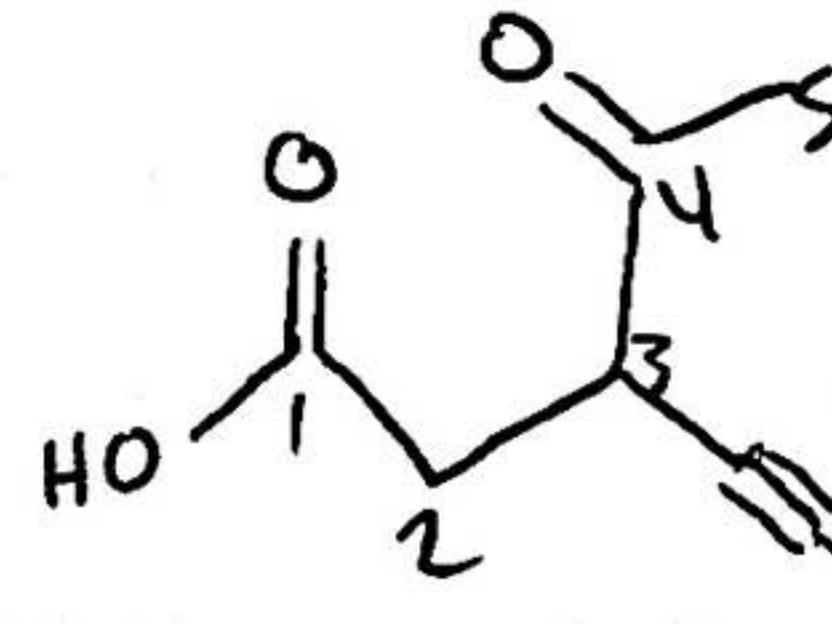


12) Provide the IUPAC name for the following structures



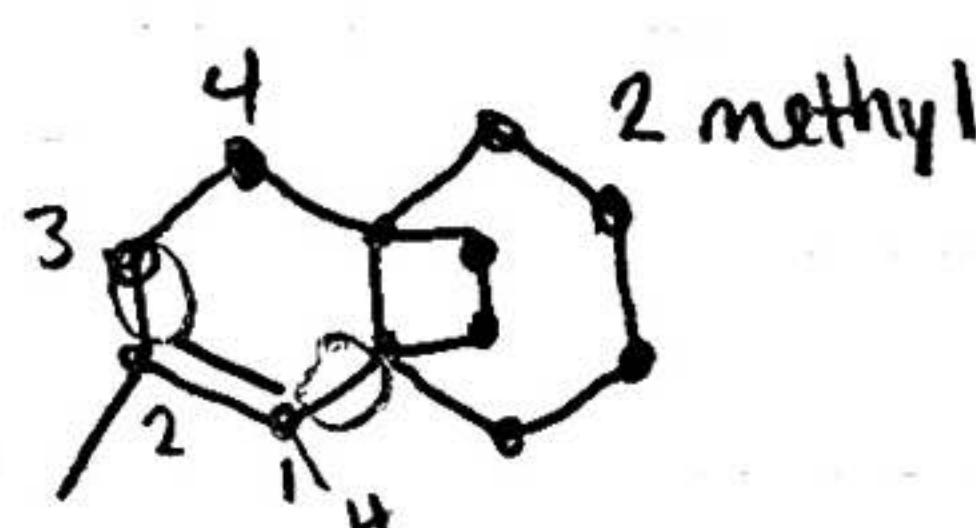
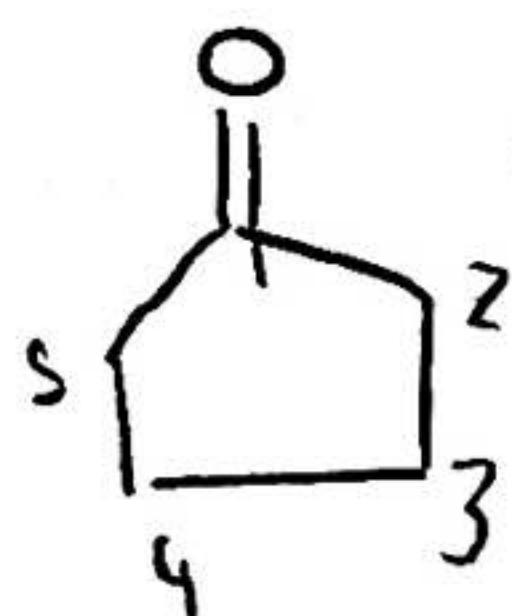
3-methyl 1-hydroxy bicyclo[4.1.0]heptane

2,6-dimethyl hept-5(1)-enal



3-(2-bromoethynyl) 4-keto pentanoic acid

cyclopentan-1-one



Tricyclo [4.4.2.0] dodec-1(2)-ene

13) Fill in the blanks and or state the definition

- Opposites repel and like charges attract
- Electronegative verses electro-positivity
- What is a sigma bond? Why is a sigma bond stronger than a pi bond?  $\sigma$  bond = symmetrical overlap of orbitals  $\sigma$  stronger than  $\pi$  b.c.
- What direction do electron arrows flow? From (+)  $\rightarrow$  (-) or from (-)  $\rightarrow$  (+)
- Two N is followed by two out
- What is the difference between conformation and configuration  $\rightarrow$  fixed 3D. shape, defined by bonds between atoms

$\chi^-$  = likes having  $e^-$        $\chi^+$  = doesn't like having  $e^-$   
 $\downarrow$                                    $\downarrow$   
spatial arrangement, atoms adopt freely & convert rotation about individual single bonds  
 $\downarrow$                                    $\downarrow$   
e.g.  $1s^2 2s^2$                       e.g. newmans projections



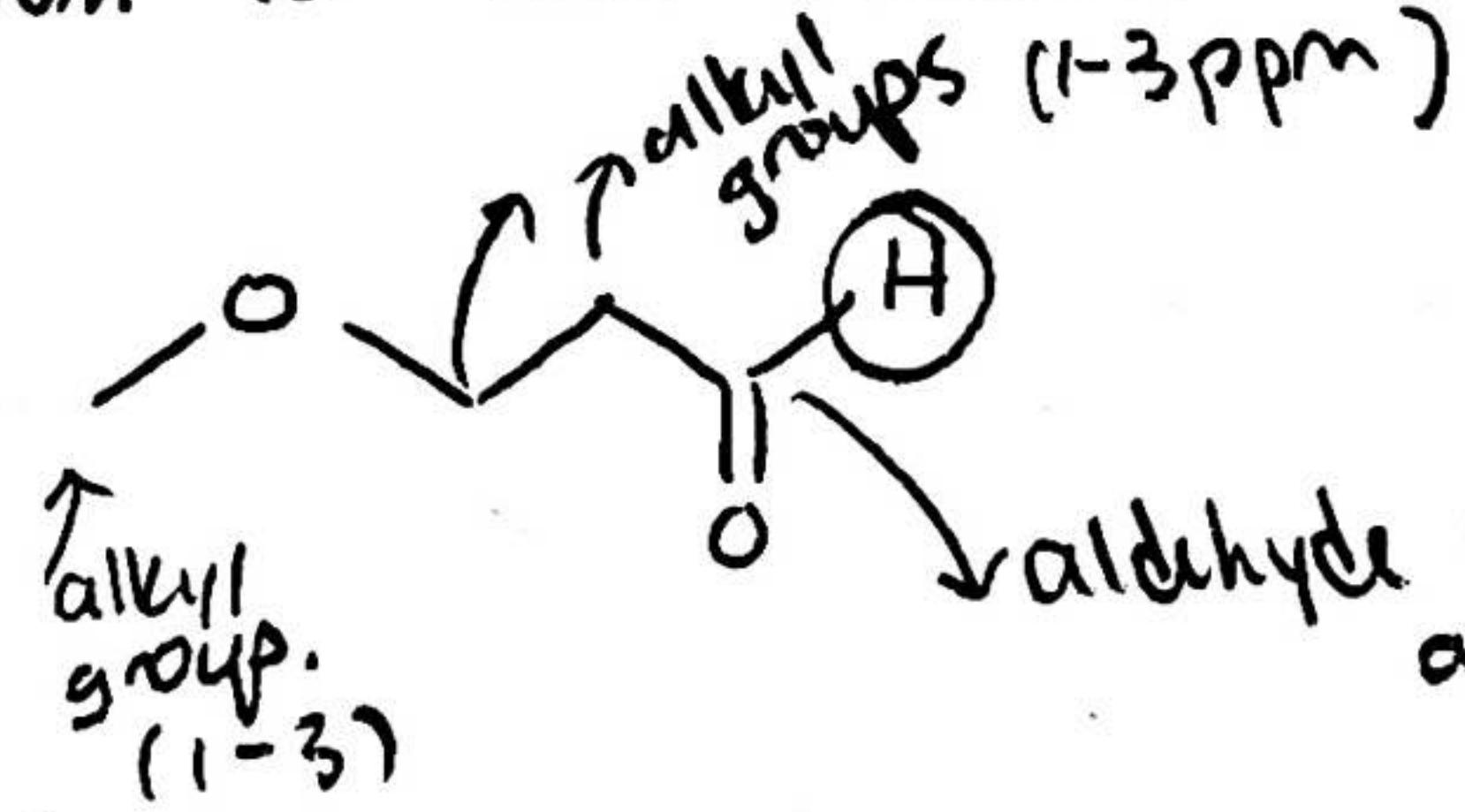
14) True or False

- An eclipsed conformation is less stable than a staggered conformation
- Resonance is the movement of sigma bonds
- Sigma bonds are overlap orthogonal to the bond axis
- Pi bonds are weaker than sigma bonds
- NMR stands for nuclear magnetic resonance
- Phthalate is held in plastic materials by Van der Waals forces  $\checkmark$
- Conformation represents the order of atoms locked in place in a molecule
- NMR gives an insight on the structure of a compound
- DBE stands for double bond energy equivalence
- It is not necessary to draw all lone pairs in a lewis diagram
- The room number of where your class is held is EME 0040 (he may ask questions like this for bonus don't be fooled)

15) Using your knowledge of  $^1H$  NMR , predict the spectrum for this molecule.

spectrum for this molecule.

could really only answer where functional groups will show up, this wasn't covered



aldehyde will be 9-10 ppm around  
deshielded e- poor

- 16) A New potassium isotope is proposed  $^{38}\text{K}$ . Discuss if it is an NMR active nucleus or not.

YES (9 protons, 19 neutrons)

odd + odd = NMR active

- 17) Give a reason why the pattern below can't be a quartet.



- 18) FULLY interpret the data below (right on the spectrum) and draw the correct structure in the box consistent with the spectral data. The molecular formula is  $\text{C}_8\text{H}_9\text{Br}$

