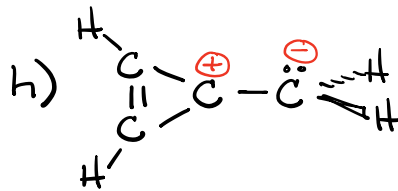
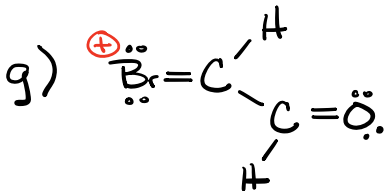
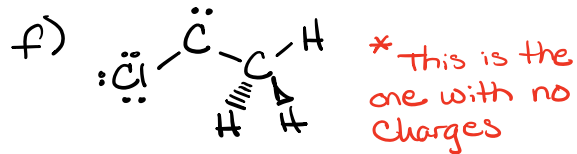
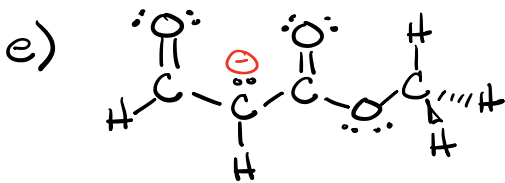
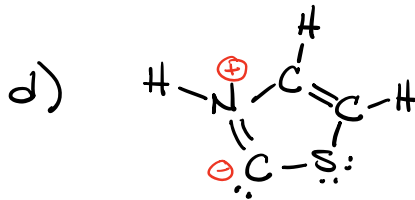
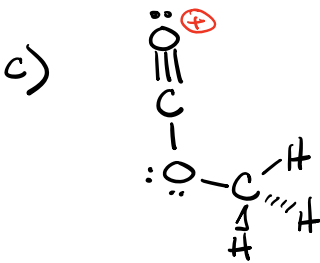
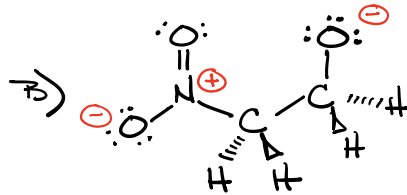
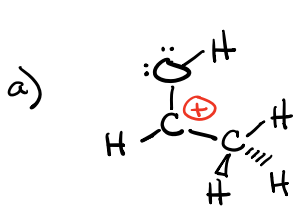


2/4/22

SI Problem Set - Key

Formal Charge - * Each of these structures have one or more formal charges. Indicate the formal charge(s) by placing a \oplus or \ominus next to the appropriate atom(s) *one structure has no charges

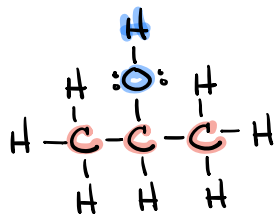
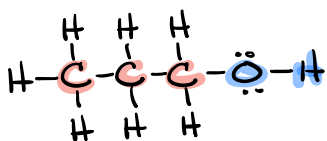


Lewis Structures

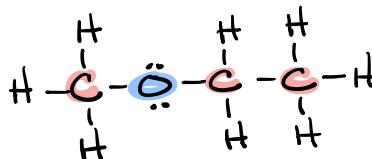
Each of the given molecular formulas has the number of possible isomers indicated. Draw Lewis Structures for all of the isomers. Do not repeat structures.

a) C_3H_8O (3 structures possible)

C-C-C Framework

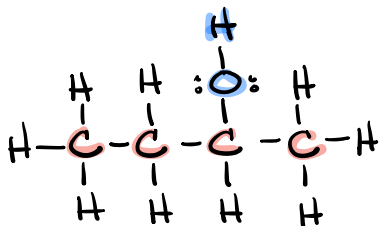
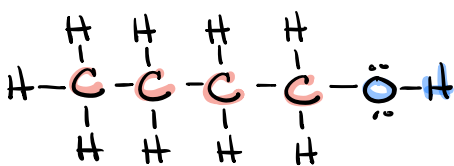


C-O-C-C Framework

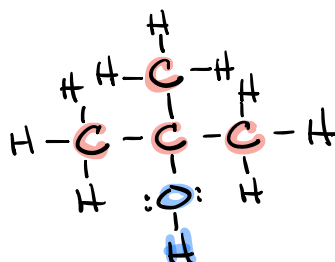
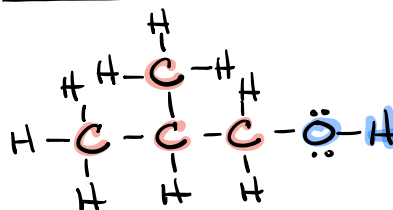


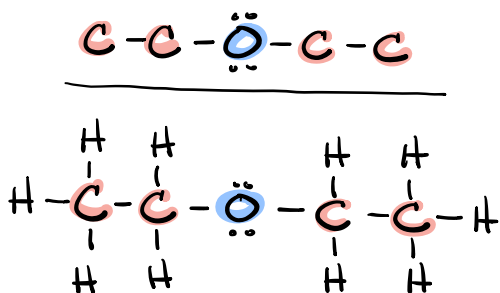
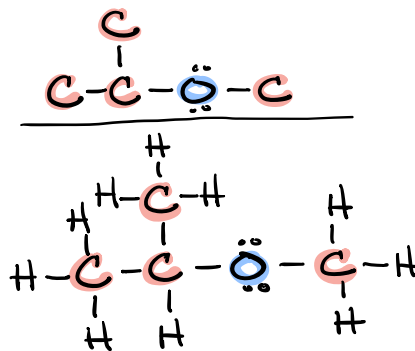
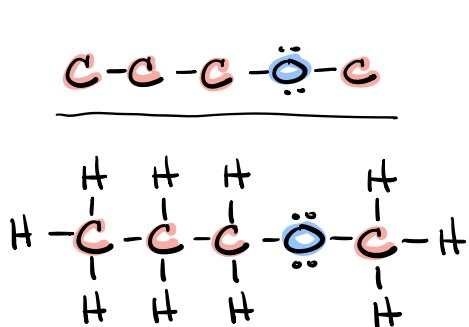
b) $C_4H_{10}O$ (7 structures possible)

C-C-C-C

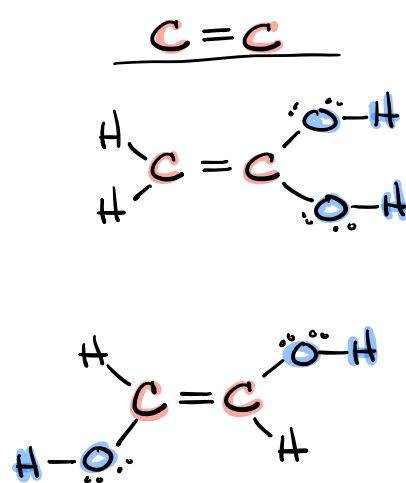
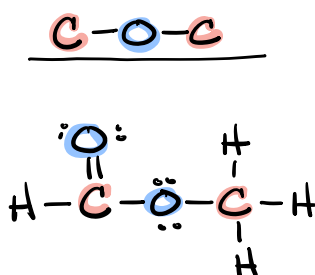
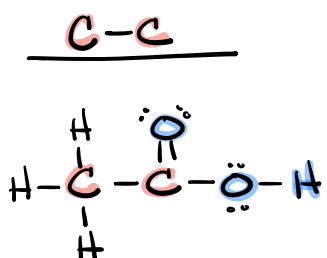


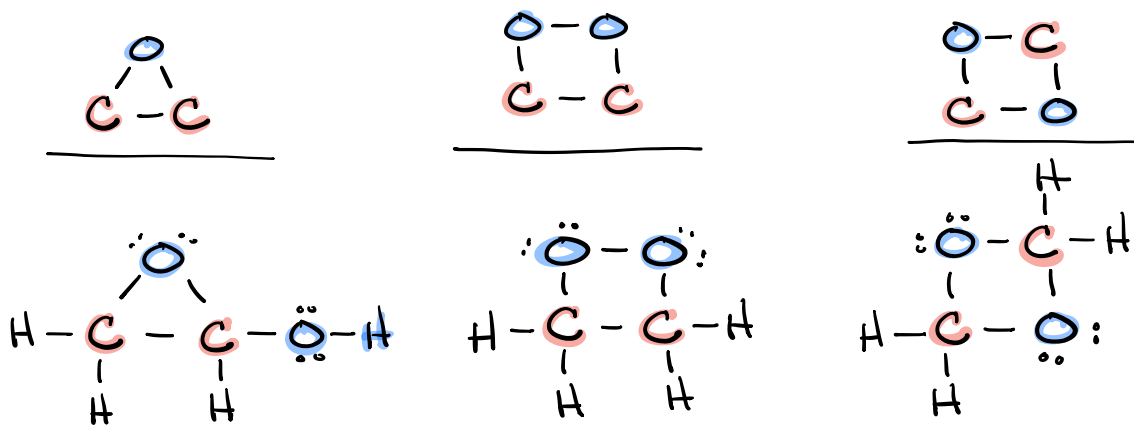
C-C-C-C





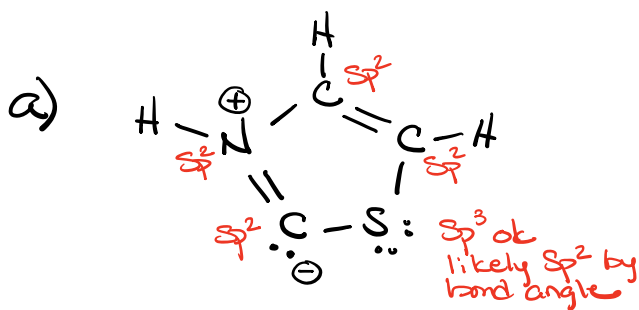
c) $\text{C}_2\text{H}_4\text{O}_2$ (8 structures possible)



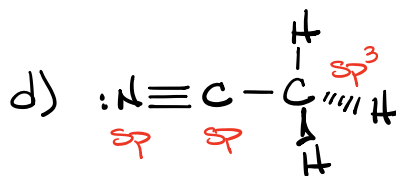
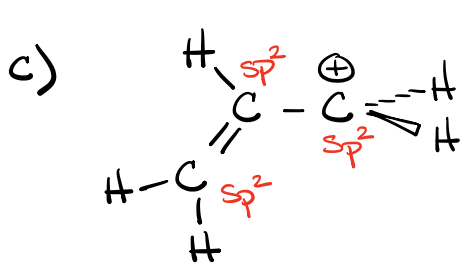
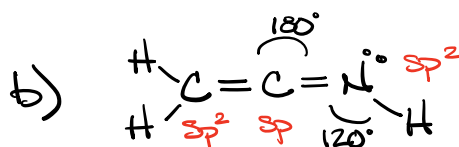


Hybridization

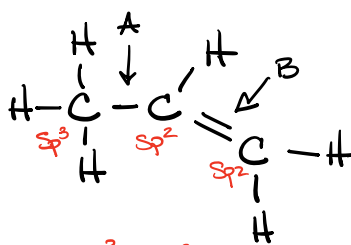
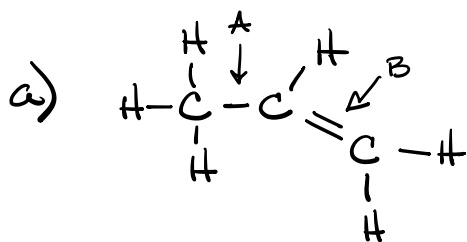
Give the hybridization of all elements other than hydrogen. Where an atom has a lone pair or a charge, use the given bond angle to help determine the hybridizations.



Carbon, nitrogen, sulfur
all trigonal planar.



Indicate which bond is longer



$$A = sp^3 - sp^2$$

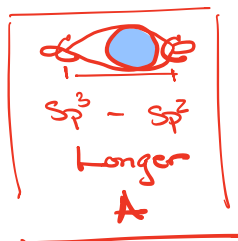
$$B = sp^2 - sp^2$$



- Bonding Requires orbital overlap

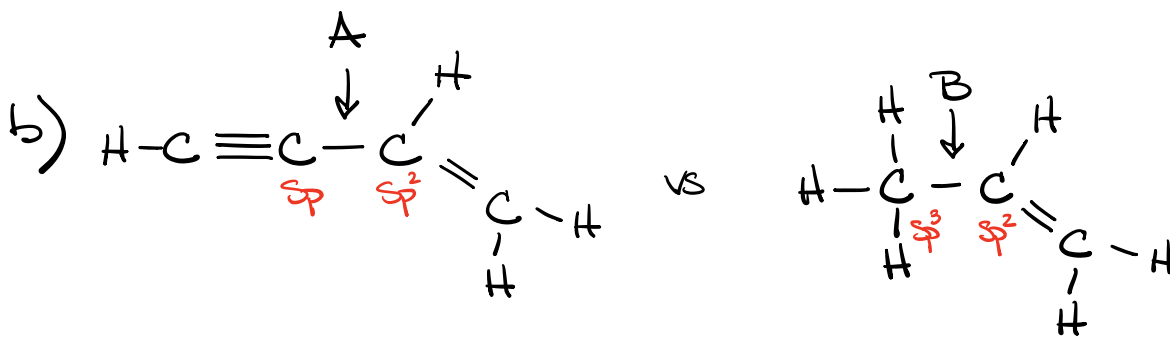
- Orbital size decreases from $sp^3 > sp^2 > sp$

- As orbital size decreases the atoms must move closer together to maintain orbital overlap for the bond



vs





$$A = sp - sp^2$$

$$B = sp^3 - sp^2$$



- Bonding Requires orbital overlap

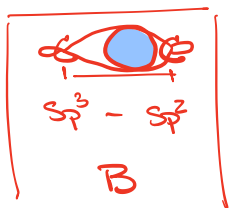
- Orbital size decreases from $sp^3 > sp^2 > sp$

- As orbital size decreases the atoms must move closer together to maintain orbital overlap for the bond



A

vs



B

Longer