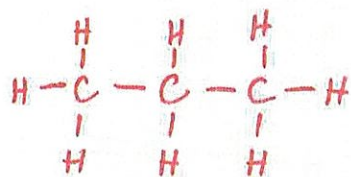


What is the most important question in chemistry?

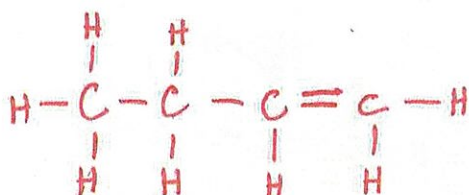
Where are the electrons?

For the following molecular formulas, draw complete Lewis line structures in which all atoms (even H atoms) are drawn, lines are used as bonds, and all lone pairs and formal charges are drawn.

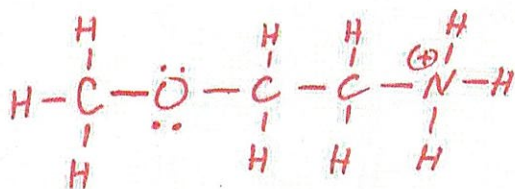
a) $\text{CH}_3\text{CH}_2\text{CH}_3$



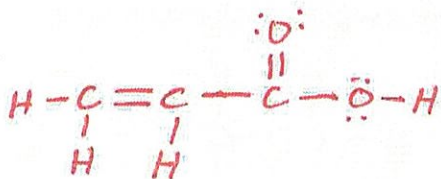
b) $\text{CH}_3\text{CH}_2\text{CHCH}_2$



c) $\text{CH}_3\text{OCH}_2\text{CH}_2\text{NH}_3$



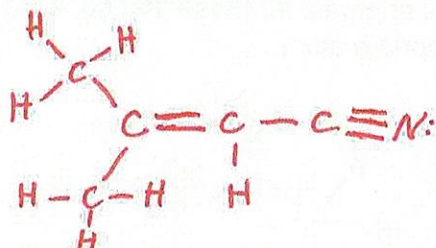
d) $\text{CH}_2\text{CHCO}_2\text{H}$



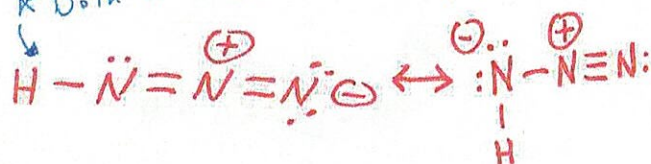
e) CH_2CCH_2



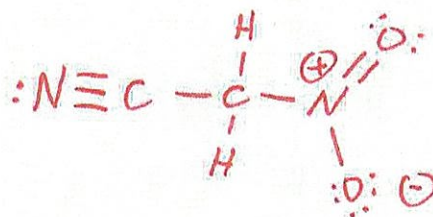
f) $(\text{CH}_3)_2\text{CCHCN}$



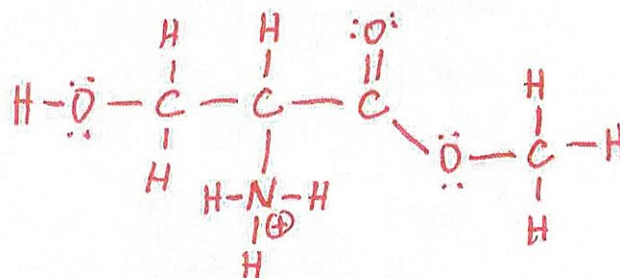
g) HN_3



h) CNCH_2NO_2

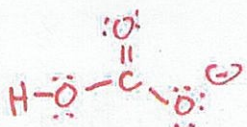


i) $\text{CH}_2\text{OHCHNH}_3\text{CO}_2\text{CH}_3$

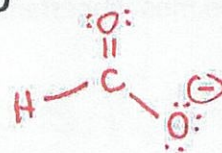


Draw the Lewis structures for the following molecules.

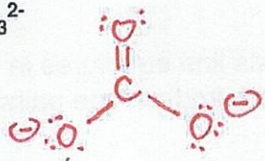
a) HCO_3^-



c) HCOO^-

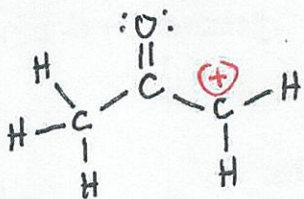


b) CO_3^{2-}

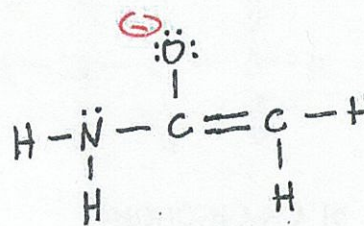


The following structures have all lone pairs drawn in. Some of the molecules have formal charges, for those that do, write in the correct formal charge next to the appropriate atom.

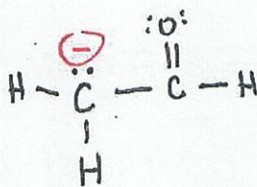
a)



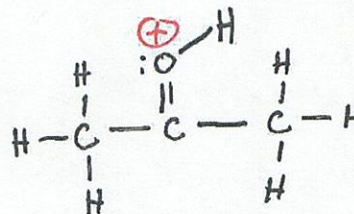
d)



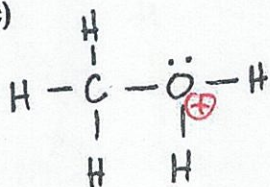
b)



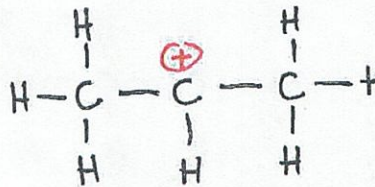
e)



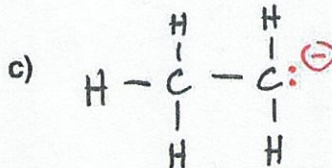
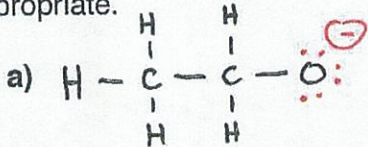
c)



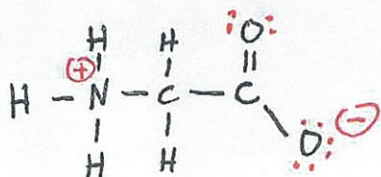
f)



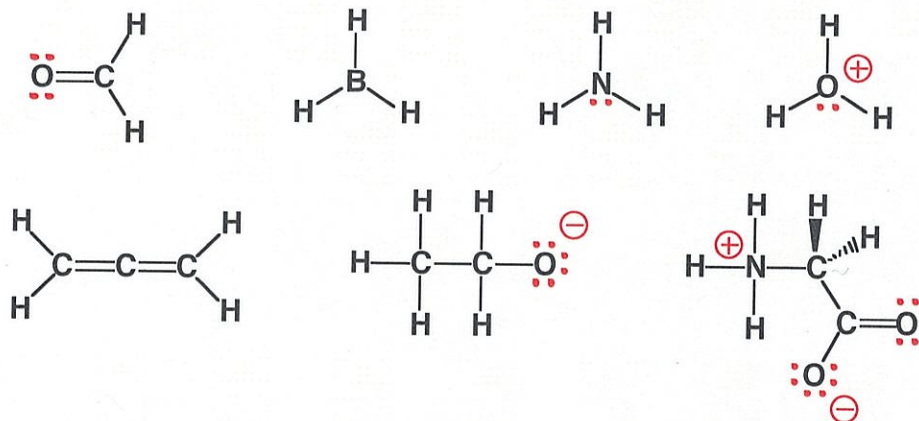
Some of the molecules shown below have formal charges. For those that do, write the correct formal charge next to the appropriate atom. In addition, some of the atoms on these molecules need lone pairs added. Add all valence lone pairs of electrons where appropriate.



b)



4. (11 pts) Some of the molecules shown below have formal charges. For those that do, write the correct formal charge next to the appropriate atom. IN ADDITION, SOME OF THE ATOMS ON THESE MOLECULES NEED LONE PAIRS ADDED. ADD ALL VALENCE LONE PAIRS OF ELECTRONS WHERE APPROPRIATE.



5. For the following molecules: 1) Use the \rightarrow sign to indicate the direction of the bond dipole in all of the **polar** bonds. 2) Circle all molecules that have a measurable molecular dipole moment.

3) For the molecules you circled, to the best of your artistic ability, use an additional \rightarrow sign to indicate the direction of the molecular dipole moment on the left side of the molecule.

(20 pts total)

