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**Chemistry 320M/328M
Dr. Brent Iverson
1st Homework
August 26, 2024**

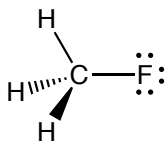
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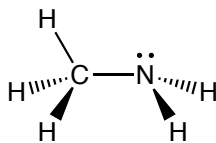
(5 pts) Fill in the blank with the most appropriate word(s) or number(s).

1. The most important question in chemistry is: _____?
2. Atoms prefer a _____ valence shell of electrons. The vast majority of stable _____ in molecules takes place in such a way that this is accomplished.
3. Neutral Oxygen atoms take part in _____ bond(s) and has _____ pair(s) of electrons.
4. An Oxygen atom with a negative 1 formal charge (-1) takes part in _____ bond(s) and has _____ pair(s) of electrons.
5. When two atoms of different electronegativities form a covalent bond, the majority of shared electron density is found around the _____ electronegative atom.
6. (4 pts) Use the $\text{+} \longrightarrow$ symbol to indicate on the structure the direction of the bond dipole moment of the bond listed.

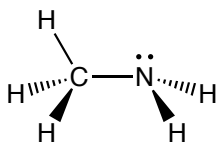
A. C-F



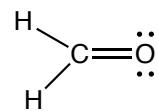
C. N-H



B. C-N

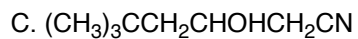
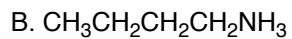
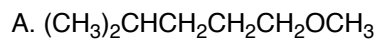


D. C=O

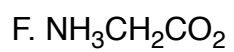
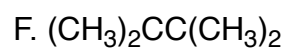
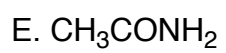
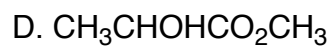


7. (1 pt) As I said in class, the most important thing is to find the most important thing. Well, here it is for emphasis, one more time. What is the most important question in Chemistry?

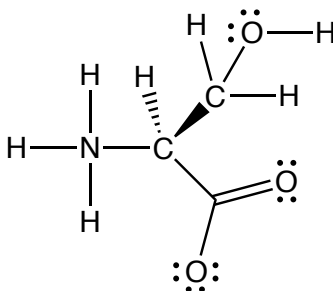
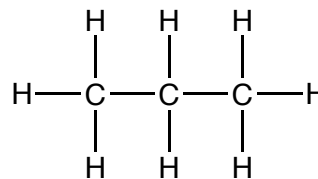
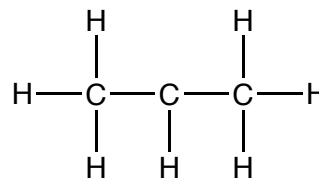
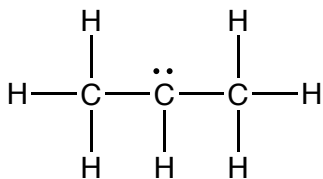
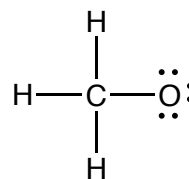
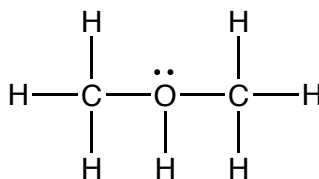
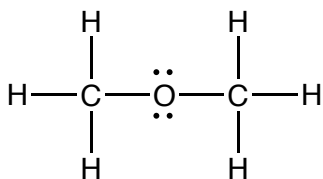
8. (14 pts) For the following molecular formulas, draw complete Lewis structures in which all atoms (even H atoms) are drawn, lines are used as bonds, and all lone pairs and formal charges are drawn.



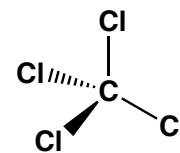
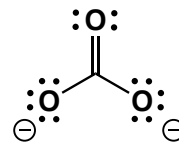
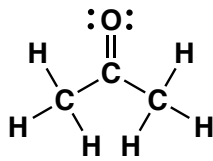
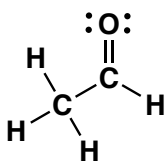
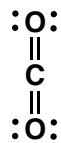
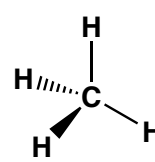
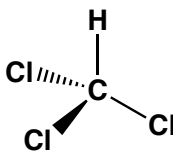
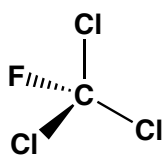
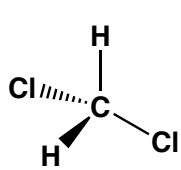
8 (cont.)



9. (8 pt) Put all appropriate formal charges on the following molecules.



10. (1 pt each) Circle any molecule that has an overall molecular dipole moment (this one might be considered pretty hard, there is a lot to think about).



11. (3 pts) Write the first two “Golden Rules of Chemistry” that we have presented in this class (I want the first two I presented so far). Hint: These are not necessarily the first two listed the website, we jump around with the rules!

12. (5 pts) One of the most difficult aspects of organic chemistry is learning how to think creatively about synthesis, which is the construction of valuable complex molecules from cheap simpler ones. To be successful, one must be able to look at a final molecule, recognize the right details, then work backwards using known reactions until reaching the beginning, namely a simpler starting molecule. This type of thinking is new to most students and many find it very difficult to master at first. Based on conversations with previous students, we are trying something new in an attempt to prepare you long before we hit actual synthesis problems. What we are going to do is provide a brief situation for you to analyze. We want you think about ways that scenario could have come about, working backwards to the beginning.

The following is a two-sentence description of a specific scenario. Think creatively, then provide a brief description of a sequence of events that could have lead to the situation described in the scenario.

"The last man on Earth sat alone in a room. There was a knock on the door."