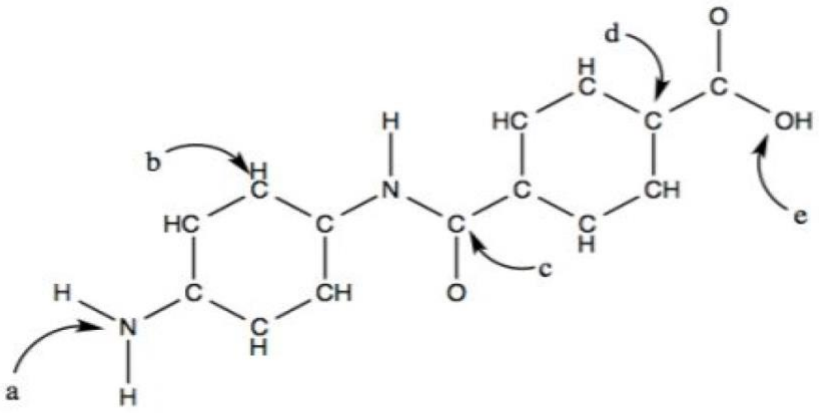
General Chemistry I
PLI Sheet #15
June 25, 2021

1.



1a) Complete the structure above by adding bonds and lone pairs. Every atom will have a complete octet and a formal charge of zero. What is the hybridization around the atoms marked a through e?

a: b: c: d: e:

1b) How many σ bonds are in the structure above? How many π bonds?

1c) Circle all of the polar bonds.

1d) What are the bond angles at a, b, c, d, and e?

a: b: c: d: e:

2. Complete the following table:

Regions of high electron density	**Electron Pair Geometry**	**Hybridization**	**Angle between electron density region**	**Total hybrid orbitals**	**P orbitals left over**
2					
3					
4					

3. **Fill out the following table!**

Name & Lewis Structure	3D Structure	Electron Pair Geometry	Molecular Geometry	Hybridization	Polarity
Ammonia					
H_2O_2					
SF_5^-					
BH_2^-					
HCN					

4. **Balance the following reaction, then using bond dissociation enthalpies from the book, lecture slides or le Google, calculate the bond dissociation enthalpy of the O-F bond. The ΔH_{rxn} -318 kJ/mol.**

$$\_\_\_\_ OF_2\,(g) + \_\_\_\_ H_2O\,(g) \rightarrow \_\_\_\_ O_2(g) + \_\_\_\_ HF\,(g)$$

5. **Draw a likely spatial orientation of a single water molecule with a single molecule of NaCl.**

6. **True or False:**
   a. **The principal quantum number (n) associated with an f orbital must be ≥4**
   b. **For an electron to go from a lower energy level to a higher energy level, a photon must be absorbed**
   c. **The freezing of water is an endothermic process**
   d. **The first ionization energy of Li is less than the second ionization energy of Li**
   e. **The electronegativity of H is less than that of Mg**
   f. **Cations are always larger than the neutral atom of the same element.**

7. **Name three atoms or ions that are described by the following electron configuration:**

   $[Ar]4s^2 3d^{10} 4p^5$