Chem 343 – Practice Quiz 2

1. (a) Ozone is found in the upper atmosphere where it absorbs UV radiation and thereby provides the surface of earth with a protective screen. Provide the best Lewis structure of ozone by adding all appropriate multiple bonds (π-bonds if any), lone pairs of electrons, and formal charges at atoms (Zero formal charges don’t have to be indicated). Write another equivalent resonance structure based on the structure you have completed.

   O–O–O

   Ozone

(b) Based on the resonance structures of ozone you have in (a), predict the relative bond lengths of the two oxygen-oxygen bond of ozone.

(c) Use one of the resonance structures you have in (a), and provide the hybridization state of the three oxygen atoms.

(d) Use the hybridization information of all the atoms in (c) and provide the shape (linear, tetrahedral, bent, trigonal pyramidal and etc.) of ozone molecule with bond angle.
2. Taxol, isolated from the bark of the Pacific Yew tree, is an anticancer drug used in the treatment of ovarian cancer.

(a) Identify and **name** circled functional groups 1–5 in the following structure.

(b) Write structural formula for

1. **Carboxylic acid** with the formula \( C_3H_6O_2 \).

2. **Aldehyde** with the formula \( C_4H_8O \).

3. A **secondary amine** with the formula \( C_3H_9N \).

3. There are five functional groups that contain the carbonyl group (C=O). Provide the specific connectivity and an example of each functional group.
Example: Alcohol, \[ \text{C}^{-\text{O}}{\text{H}}_\text{ether} \] connectivity ethanol

4. Which compound in each of the following pairs would have the higher boiling point? Explain your answers.

1. \[ \text{Cl}-\text{Cl} \] vs \[ \text{Cl} \equiv \text{Cl} \]

2. \[ \text{O} \] vs \[ \text{OH} \]

5. (a) Guanidine is a substantially stronger base than either methylamine \( \text{CH}_3\text{NH}_2 \) or acetone imine \( \text{(CH}_3\text{)}_2\text{C}=\text{NH} \). Write the best Lewis structures (show multiple bonds,
lone pairs of electrons, and formal charges at atoms) for protonated structure at the two different kinds of nitrogen atoms in guanidine.

(b) Which nitrogen of guanidine is most easily protonated? Explain in terms of resonance structures.