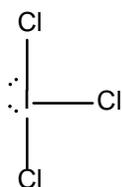
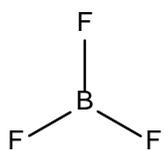
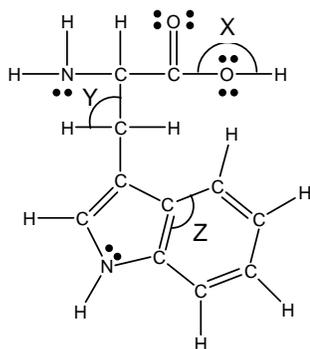


## Quiz 4 – Oct. 2, 2019

1. (3 pts) Which of the following molecules is/are **polar**? **Circle all that apply.**



2. (10 pts) A **Lewis structure** for the amino acid tryptophan,  $C_{11}H_{12}N_2O_2$ , is shown below.



- a. Please **estimate the bond angles** X, Y, and Z as accurately as possible. Write your answers on the blanks below.

**Angle X:** \_\_\_\_\_      **Angle Y:** \_\_\_\_\_      **Angle Z:** \_\_\_\_\_

- b. Please specify the **type of hybrid orbitals** used by the central atoms in Angles X and Z:

**O**Angle x: \_\_\_\_\_

**C**Angle z: \_\_\_\_\_

3. (12 pts) Suppose that propane gas,  $C_3H_8$ , is completely combusted in air to form carbon dioxide and water.

- a. **Write and balance** the chemical reaction describing this process.

- b. Suppose you want to calculate the mass of oxygen that is required to react with 500.0 g of propane. **Very briefly, explain the steps** you would take to do this. Be sure to specify all information that you would use or determine along the way. (**Note:** You should **not** do any actual calculations here.)