HOMEWORK ASSIGNMENT #1:ORGANIC CHEMISTRY I (30 pts)

**Lewis Modeling:** Due Wed 7 September 2016

**Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1a) Draw the most stable **Lewis dot** electronic configuration for **O** in CaO and **clearly indicate its charge i**n your drawing:

1b) Write down the equivalent,***complete*** electronic configuration for the above species.

(remember: complete configuration means starting with 1s22s2…etc)

1c) Does O as drawn above appear to obey the octet rule ? YES NO

2a) Draw the most stable Lewis dot electronic configuration for one of the O in O2 and **clearly indicate its charge** in your drawing:

2b) Write down the equivalent, complete electronic configuration for the above species:

2c) Does O as drawn above appear to obey the octet rule ? YES NO

2d) Compare your answers in 1c and 2c. Explain why both O are stable in the two compounds despite the disparity you should have observed in your answers.

3. Draw the most stable Lewis structures that conform to the octet rule for the covalent and polar covalent compounds below. Make sure to indicate any formal charge present on each atom: (2 pts each)

* 1. O2 b) CO

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1. (continued)
2. phosgene , COCl2 note: C is central to O and both Cl (2 pts)
3. sulfur dioxide, SO2  note: S is centrally bonded to both O (2 pts)
4. If SO2 ‘s bonding conforms to the rule that the octet rule can be broken to minimize formal charge for elements starting with P forwards, what is the best structure for SO2 ? (1 pt)

4a) Given that thionyl chloride (SOCl2) is entirely single-bonded, what are the

expected formal charges on the individual atoms ?Assume S is central to O & both Cl (2 pts)

S\_\_\_\_ O \_\_\_\_\_ Cl(#1) \_\_\_\_\_\_\_ Cl(#2) \_\_\_\_\_\_\_

4b) If the S is double-bonded to one of the Cl, ***draw*** the most stable Lewis structure with the formula SOCl2 which obeys the octet rule . Indicate any formal charges on each atom. (Assume S is central to O and both Cl. The overall molecule can be either a cation or an anion, e.g. it can hold a net charge) (2 pts)

4c) If you don’t make any assumptions about how SOCl2 atoms are connected, draw a

structure that minimizes total charge, individual formal charges and best satisfies the octet rule for all the atoms (2 pts)

5.) Explain why CO is over 200 times more likely to react with the iron in your blood than O2 ? (The reactivity difference explains why you can asphyxiate yourself by sitting in your car as it runs in a closed garage.) {2 pts)

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6. Decide whether the pairs below are the same or different chemical species and briefly explain ***why*** they are the same or different: (2 pts each/6 pts total)

