Student Name _____ Date _____

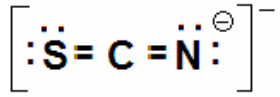
LEWIS STRUCTURES MARATHON HW ASSIGNMENT (40 pts)
Dr. Katz – Advanced Chemistry

Instructions: For each molecule or ion listed in Part 1 (1-40) a) draw a valid **Lewis structure**, b) predict the **bond angle** around the central atom (or one of the central atoms), c) identify its **molecular shape** around that atom, and d) state whether or not the molecule is **polar**. If the molecule requires **resonance structures**, draw all the equal energy resonance structures connected by ↔ arrows. Finally, write all *non-zero* **formal charges** appropriately encircled. Be sure to put **brackets** for all ions and PLEASE write legibly. Complete Parts 2 and 3. Please complete assignment on additional sheets of paper, and **attach to this cover sheet**. *Answers to this assignment are posted – you are expected to both* **check** *and* **correct** *your answers* ***BEFORE*** *you submit your assignment to receive full credit.*

Part 1. Molecules and Ions Some helpful hints: when you are writing Lewis structures for acids* (H written in the front of the formula, e.g.: H-X), write the structure for the conjugate base (the X anion) first. The atom which has the negative formal charge in the X anion will identify the location of the H in the acid. Also, if you aren't sure how to arrange the atoms, try the most symmetrical formation first, and if that doesn't work, try the arrangement that mimics the way the formula is written, e.g. SCN^- is connected S-C-N. A sample problem is done for you below:

1. O_2
2. CH_4
3. H_2
4. Cl_2
5. PH_3
6. NH_3
7. NH_4^+
8. NH_2^-
9. H_2O
10. H_3O^+
11. OH^-
12. N_2
13. SiO_2
14. CO_2
15. OF_2
16. H_2S
17. PCl_3
18. CCl_4
19. CHI_3
20. CH_3OH
21. H_2Te
22. ClO_3^-
23. $*HClO_3$
24. ClO_2^-
25. ClO^-
26. $*HClO$
27. NO_3^-
28. $*HNO_3$
29. NO_2^-
30. NO_2^+
31. $*HClO_4$
32. $*H_2SO_4$
33. $*HCN$
34. C_2H_4
35. C_2H_2
36. SO_2
37. SO_3^{-2}
38. O_3
39. CO_3^{-2}
40. CS

SCN^-
16 e-

a) 

b) 180°
c) linear
d) polar

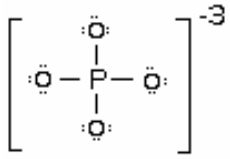
Part 2. Questions

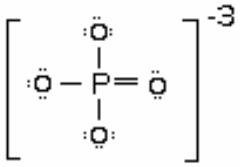
1. For the molecules and ions listed in part 1, identify which are non-polar ONLY BECAUSE THEY CONTAIN NON-POLAR BONDS.

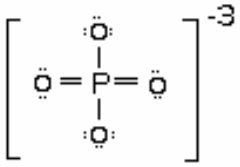
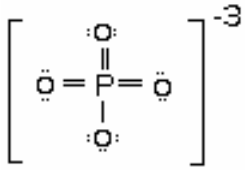
2. Based upon the structures you drew for the molecules oxygen, O_2 and ozone, O_3, which molecule has the greater O-O bond order? Which molecule has the greater bond length?

Part 3. Structure Analysis

Refer to the four Lewis structures below for the phosphate ion, PO_4^{-3}
For each structure (a-d), indicate *whether or not the structure is valid*, and explain why or why not. Identify *which of these* is the BEST STRUCTURE and explain your choice.

a: 

b: 

c: 

d: