

Unit 2 – Chapters 8,9: Bonding & Hybridization

Name _____

Assignment #2: Lewis Structures & Stability, Formal Charge, Resonance

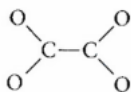
Period _____

- 1) Write the Lewis structure for O_2F_2 (O_2F_2 exists as F-O-O-F). Assign oxidation states and formal charges to the atoms in O_2F_2 . This compound is a vigorous and potent oxidizing and fluorinating agent. Are oxidation states or formal charges more useful in accounting for these properties of O_2F_2 ?
- 2) Oxidation of the cyanide ion produces the stable cyanate ion, OCN^- . The fulminate ion, CNO^- , on the other hand, is very unstable. Fulminate salts explode when struck; $\text{Hg}(\text{CNO})_2$ is used in blasting caps. Write the Lewis structures and assign formal charges for the cyanate and fulminate ions. Why is the fulminate ion so unstable? (C is the central atom in OCN^- and N is the central atom in CNO^- .)
- 3) Draw Lewis structures for the following species. (The skeleton is indicated by the way the molecule is written).
 - a) Cl_2CO
 - b) $(\text{HO})_2\text{-S-O}$
 - c) $\text{F}_2\text{C-CCl}_2$
- 4) Glycine, an essential amino acid, has the formula $\text{NH}_2\text{CH}_2\text{COOH}$. Its skeleton structure has C-C and C-N bonds, but no N-O bonds. Write its Lewis structure.

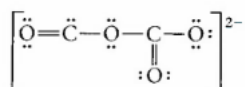
- 5) Draw resonance structures for:

- a) NO_2^-
- b) NNO
- c) HCO_2^-

- 6) The oxalate ion, $\text{C}_2\text{O}_4^{2-}$, has the skeleton structure below:



- a) Complete the Lewis structure of this ion.
- b) Draw three resonance forms for $\text{C}_2\text{O}_4^{2-}$, equivalent to the Lewis structure drawn in a).
- c) Is the below structure a resonance form of the oxalate ion? Explain your answer.



7) What is the formal charge on the indicated atom in each of the following species?

a) sulfur in SO_2

b) nitrogen in N_2H_4

c) each oxygen atom in ozone, O_3

8) Below are two different Lewis structures for the thiosulfate ion ($\text{S}_2\text{O}_3^{2-}$). Which is the better Lewis structure based only on formal charge?

