

February 10, 2015

## Chem 11 HL

### Calculating Formal Charges

1. There are 3 possible Lewis structures for  $\text{N}_2\text{O}$ . Draw all three structures and find the formal charge on each atom. Which is the more stable structure?
2. Draw the two possible Lewis structures for  $\text{NOCl}$ . The Cl atom and the O atom are both bonded to the N atom. Find the formal charge on each atom. Which is the preferred structure?
3. Which of the two skeleton structures is more feasible? Draw Lewis structures and find the formal charge on each atom.
  - a.  $\text{H}_2\text{NOH}$  or  $\text{H}_2\text{ONH}$
  - b.  $\text{SCS}$  or  $\text{CSS}$
4. Draw Lewis structures for the following and find the formal charge on each atom:
  - a.  $\text{BH}_3$
  - b.  $\text{ClO}_3^-$
  - c.  $\text{SO}_2$

February 10, 2015

5. Draw Lewis structures and find the formal charge for each central atom:

a. HCN

b.  $\text{NO}_2^-$

c.  $\text{IF}_3$

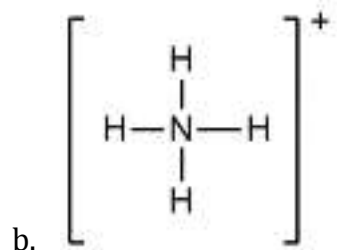
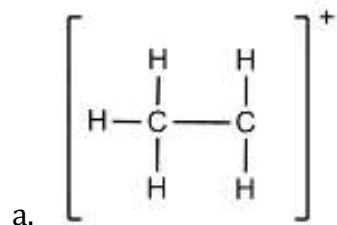
6. Draw Lewis structures and determine which is the most plausible structure based on formal charges:

a.  $\text{S}_2\text{O}_3^{2-}$

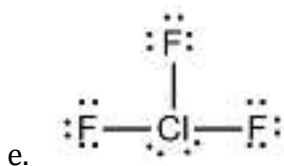
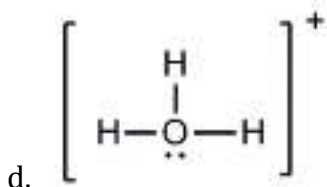
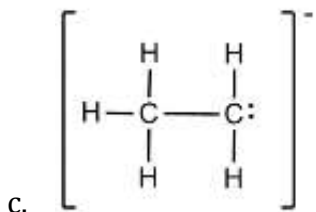
b.  $\text{ClO}_4^-$

c.  $\text{N}_2\text{O}$

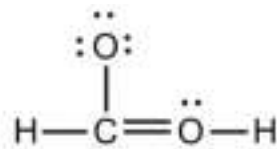
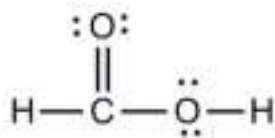
7. For the following Lewis structures, determine the formal charge on each atom:



February 10, 2015



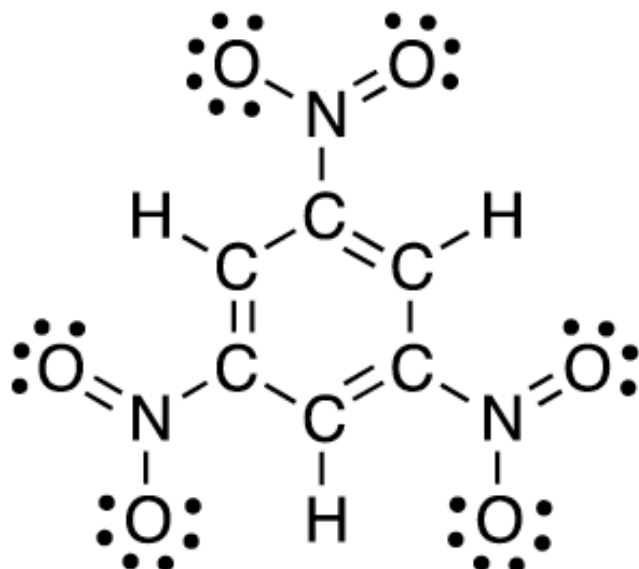
- f. For the species in a. to e. above, determine the sum of the formal charges. How does this relate to the overall charge of the compound?
8. Formic acid has a formula of  $\text{CH}_2\text{O}_2$ . Two possible Lewis structures are shown below.



- a. Calculate the formal charges on all atoms in the two structures, and predict which Lewis structure better reflects the structure of formic acid.
- b. Formic acid can lose the  $\text{H}^+$  bound to the oxygen atom to give the conjugate base, formate ( $\text{CHO}_2^-$ ). Draw the resulting ion, and calculate the formal charges of each atom.

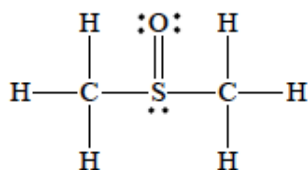
February 10, 2015

9. Assign the formal charges on the Lewis structure of trinitrotoluene (TNT) below:

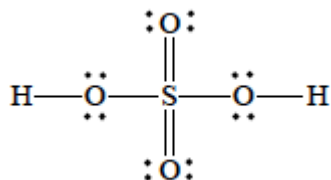


10. Calculate the formal charge on each atom in the following Lewis structures:

a. Dimethyl sulphoxide:



b. Sulphuric acid:



c. Nitromethane:

