

Ch9/Worksheet/Formal Charges and Resonance Structures/Name: _____

Calculating Formal Charge

$$\text{Formal Charge} = \text{Number of valence } e^- - (1/2 \text{ number of bonding } e^- + \text{lone pair of } e^-)$$

OR
$$\text{Formal Charge} = \text{Number of valence } e^- - (\text{number of bonds} + \text{lone pair of } e^-)$$

Resonance Structures: Determining if a structure is more stable or possible than the other

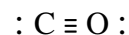
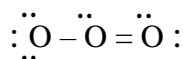
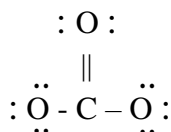
Resonance structures are structures where electrons can move around in a molecule. Electrons move only in double or triple bonds; electrons can also move in lone pairs. No bonds can be broken. No atoms can move around.

- 1) Calculate the formal charges on each atom;
- 2) If the molecule is electrically neutral, then structure is stable.
- 3) If more electronegative element has the negative charge then structure is more stable.
- 4) There should not be a positive and a negative next to each other – that destabilizes the structure.

1. Draw the Lewis structures of the following ions:



2. What are the formal charges on all the atoms following structures?



3. Which of the following are resonance pairs in the left column? If they are then which is more likely to occur? Why?

$\left(\text{: N } \equiv \text{C} - \underset{\cdot\cdot}{\text{O}} \text{:} \right)^- \text{ or } \left(\text{: } \underset{\cdot\cdot}{\text{N}} = \text{C} = \text{O} \text{:} \right)^-$	
$\text{H-C} \equiv \text{N} \text{:} \quad \text{: C} \equiv \text{N-H}$	
$\begin{array}{c} \text{: } \ddot{\text{O}} \text{:} \\ \\ \text{C} \\ / \quad \backslash \\ \text{H}_3\text{C} \quad \text{CH}_3 \end{array} \quad \begin{array}{c} \text{: } \ddot{\text{O}} \text{:} \\ \\ \text{C}^+ \\ / \quad \backslash \\ \text{H}_3\text{C} \quad \text{CH}_3 \end{array}$	