

1. (4 Pts) Draw a Lewis dot structure for the N_2 molecule that obeys the octet rule.



2. (5 Pts) Estimate the enthalpy change for the reaction $2CO + O_2 \rightarrow 2CO_2$ given the following bond energies.

$$BE(C \equiv O) = 1074 \text{ kJ/mol}$$

$$BE(O=O) = 499 \text{ kJ/mol}$$

$$BE(C=O) = 802 \text{ kJ/mol}$$



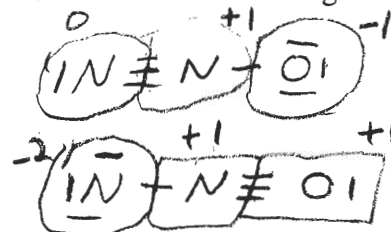
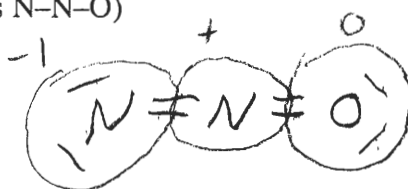
$$\begin{array}{r} 2 \times 1074 \\ 1 \times 499 \\ \hline + 2647 \end{array}$$

$$2 \times 2 \times 802 = -3208$$

$$+ 2647 + -3208 = -561 \text{ kJ}$$

3. (4 Pts) Draw a Lewis dot structure that satisfies the octet rule and determine the formal charge of each atom for N_2O (the atomic order is N-N-O)

$$\begin{array}{l} 1 \times 6 = 6 \\ 2 \times 5 = 10 \\ \hline 16 \text{ v.e.} \end{array}$$



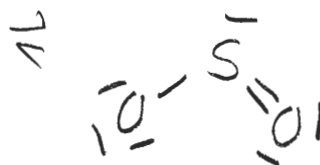
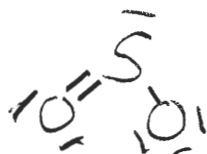
4. (4 Pts) Write a Lewis structure for the nitrate ion, NO_3^- , that obeys the octet rule and show all formal charges.

$$\begin{array}{l} NO_3^- \\ 3 \times 6 = 18 \\ 1 \times 5 = 5 \\ \hline 23 \text{ v.e.} \end{array}$$



5. (4 Pts) Draw all the resonance structures for the sulfur dioxide molecule that satisfy the octet rule.

$$\begin{array}{l} SO_2 \\ 2 \times 6 = 12 \\ 1 \times 6 = 6 \\ \hline 18 \text{ v.e.} \end{array}$$



6. (4 Pts) The total number of valence electrons in the molecule P_2O_5 is 40 and the total number of valence electrons in NH_4NO_3 is 32

$$\begin{array}{r} 10 \\ + 30 \\ \hline 40 \end{array}$$

$$\begin{array}{r} 10 \\ 4 \\ 18 \\ \hline 32 \end{array}$$