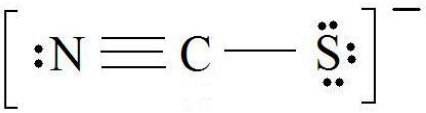
Answer on Question #64819 – Chemistry – General Chemistry

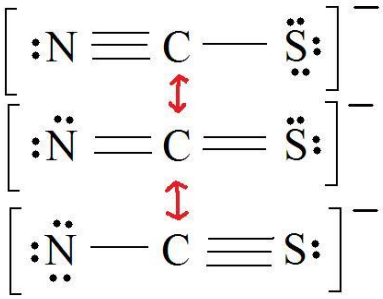
Write three Lewis structures for a species with a charge of 1- consisting of a carbon atom, a sulfur atom, and a nitrogen atom. Predict what arrangement is most likely based on the concept of formal charges. Justify your selection.

Solution.

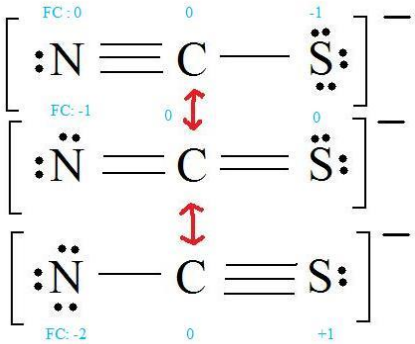
Thiocyanate CNS^-



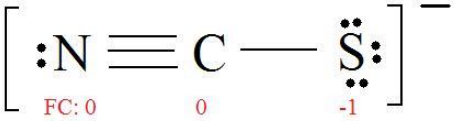
1) All elements want an octet, and we can do that in multiple ways by moving the terminal atom's electrons around (bonds too)



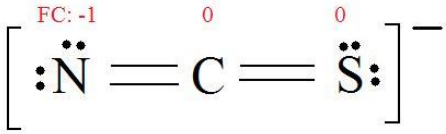
2) Formal Charge = (number of valence electrons in free orbital) − (number of lone-pair electrons) − (number bond pair electrons)
C = 4 valence e^-, N = 5 valence e^-, S = 6 valence e^-, also add an extra electron for the (-1) charge. The total of valence electrons is 16.



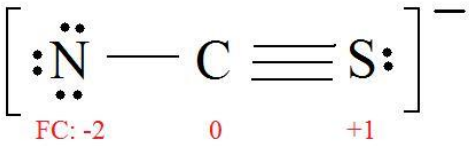
3) The most ideal resonance structure is the one with the least formal charges that adds up to zero or to the molecule's overall charge.



and

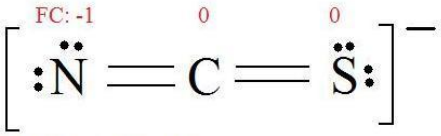


are the most ideal structures because of their minimal formal charges



Is not that commonly used because of it's formal charge. But it is still a resonance structure.

4) The most electronegative atom usually has the negative formal charge, while the least electronegative atom usually has the positive formal charges.



Electronegativity values:

N: 3.0(-1) C: 2.5 S: 2.5

This is the “correct” Lewis structure out of all the other resonances because of the electronegativity values.

Answer provided by AssignmentExpert.com