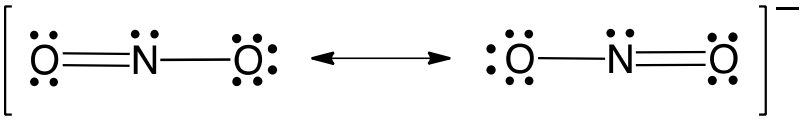
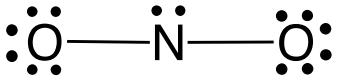
CONCEPT: RESONANCE STRUCTURES

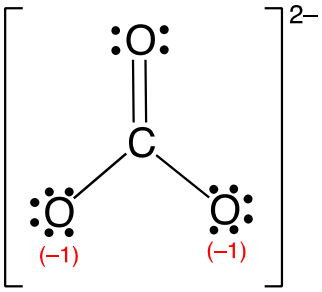
- A set of two or more valid Lewis Dot Structures for polyatomic species possessing at least _____ pi bond(s).
  - □ In a *Resonance Structure* we have the movement of only _____ from either a pi bond or lone pair.



  - □ **Double Sided Arrows:** used to show that resonance structures are _____ with each other.
  - □ The real structure is represented by the _____ of the resonance structures called the *resonance hybrid*.
  - □ **Resonance Hybrid:** A composite of all major resonance structures.
    - To draw the resonance hybrid we place a _____ anywhere a pi bond has been.



EXAMPLE: Determine the remaining resonance structures possible for the carbonate ion, CO_3^{2-}.



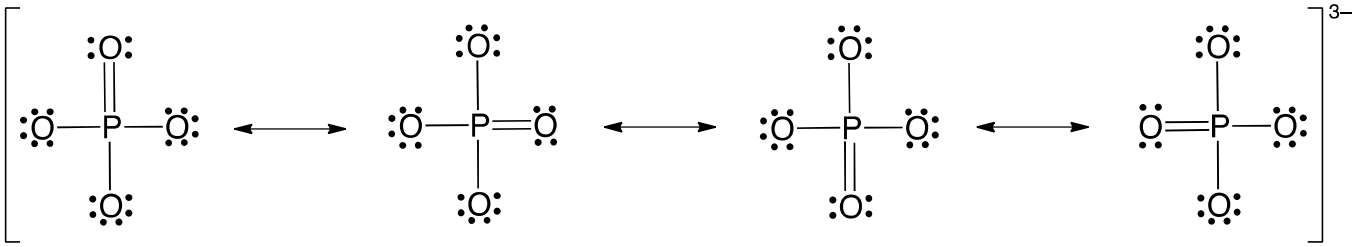
PRACTICE: Draw all possible resonance structures for the chlorate ion, ClO_3^- ?

CONCEPT: RESONANCE STRUCTURES

Average Charge

- The charge an element possesses from the _____ of all its resonance structures.

EXAMPLE: Determine the average charge of the oxygen atoms within the phosphate ion.



STEP 1: If given only the molecular formula, then draw _____ of the resonance structures.

- □ If given multiple resonance structures, choose one of them.

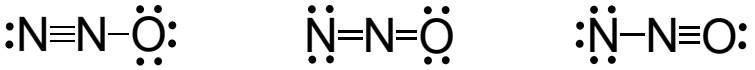
STEP 2: Calculate the formal charges for the elements and add them to determine their overall charge.

STEP 3: Divide the overall charge by the total number of those elements.

PRACTICE: Determine the average charge of the oxygen atoms within the chlorite ion, ClO_2^-.

CONCEPT: RESONANCE STRUCTURES

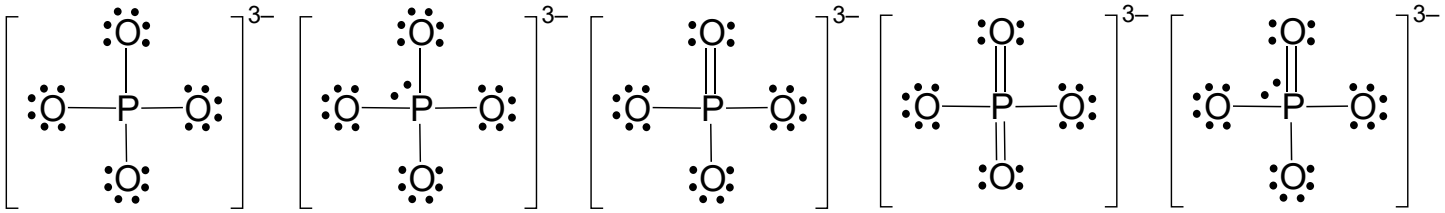
PRACTICE: Determine which of the following drawings would be the best structure for the N_2O molecule.



(a) (b) (c)

a) a b) b c) c d) All are equally stable

PRACTICE: Which of the following phosphate, PO_4^{3-} Lewis structures is the best, most valid resonance structure?



(a) (b) (c) (d) (e)

PRACTICE: Draw all the resonance structures for the following ionic compound: $RbIO_2$