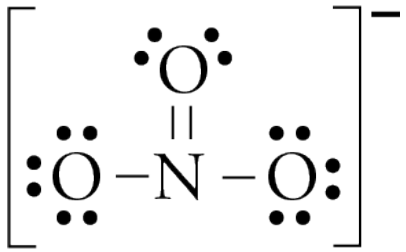
Nitrate, NO_3^-

- Lewis structure for nitrate, NO_3^-



- Seems to indicate that the N=O bond is different from the other two N-O bonds.
- Double bonds are shorter and stronger than single bonds.
- All three bonds are the same strength and length, so we need a new component for our Lewis structure process to explain this.

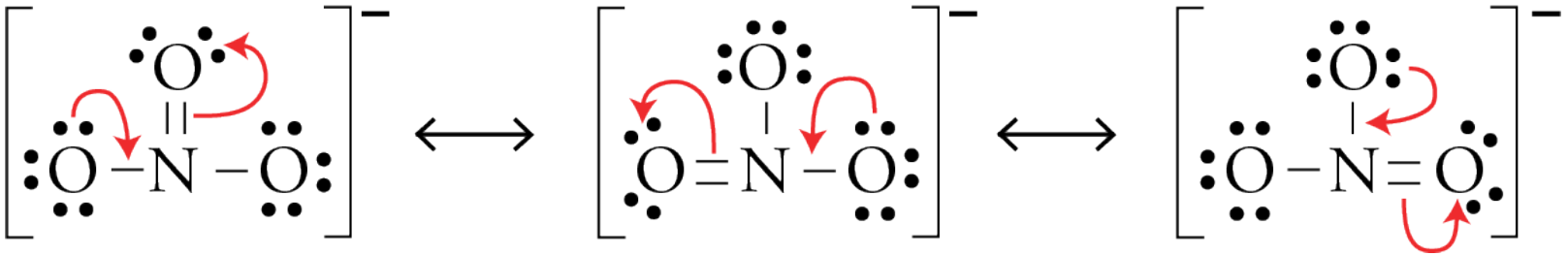
Resonance

- We can view certain molecules and polyatomic ions as if they were able to switch back and forth or resonate between two or more different structures. Each of these structures is called a ***resonance structure***. The switching from one resonance structure to another is called ***resonance***.
- We don't think this is really happening, but as we will see, we think it is useful to think of it *as if* it was happening.

Nitrate Resonance

It is as if this lone pair forms a second bond...

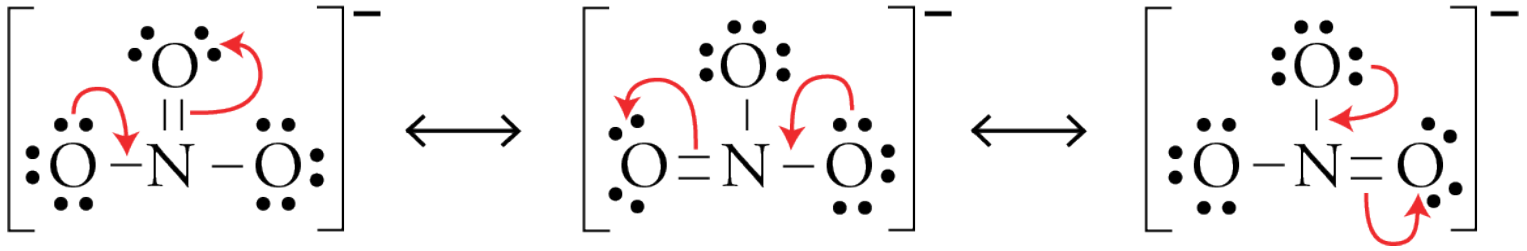
...pushing the electrons in this bond off to form a lone pair.

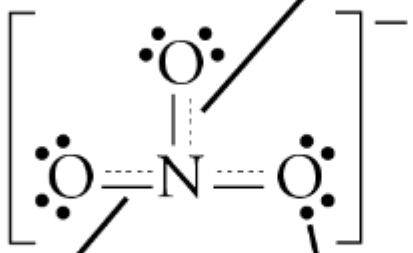


Resonance Hybrid

- To blend the resonance structures into a single resonance hybrid:
  - Step 1: Draw the skeletal structure, using solid lines for the bonds that are found in all of the resonance structures.
  - Step 2: Where there is sometimes a bond and sometimes not, draw a dotted line.
  - Step 3: Draw only those lone pairs that are found on every one of the resonance structures. (Leave off the lone pairs that are on one or more resonance structure but not on all of them.)

Nitrate Resonance





A bond found in at least one but not all the resonance structures

A bond found in all the resonance structures

A lone pair found in all the resonance structures

Formate, HCO_2^-