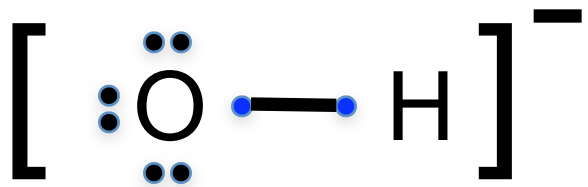
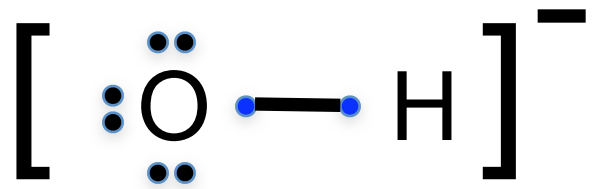
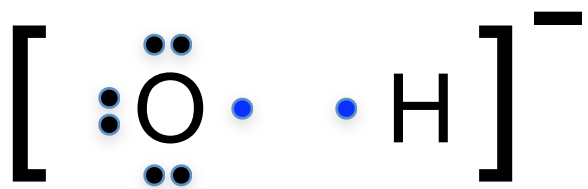
New concept



New concept



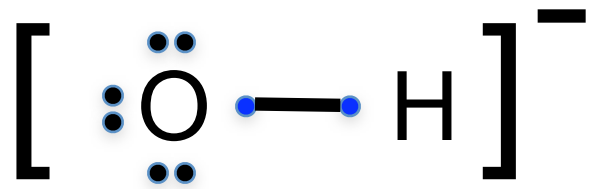


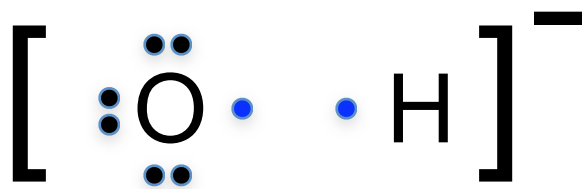
Formal Charge

Covalent assumption

Electrons shared,
one to each

New concept





Formal Charge

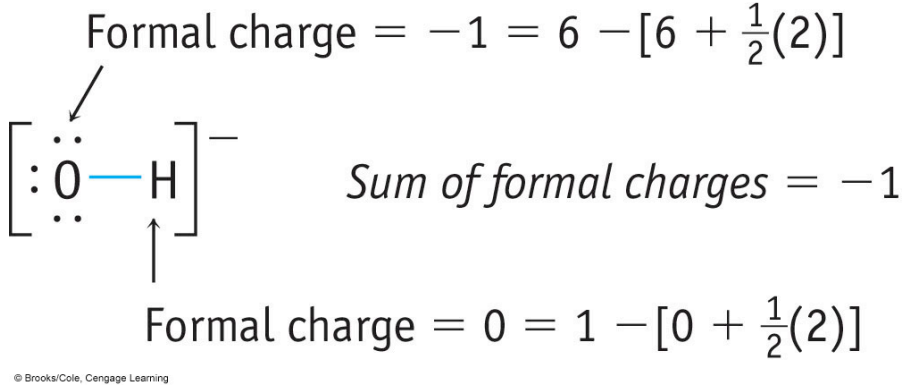
Covalent assumption

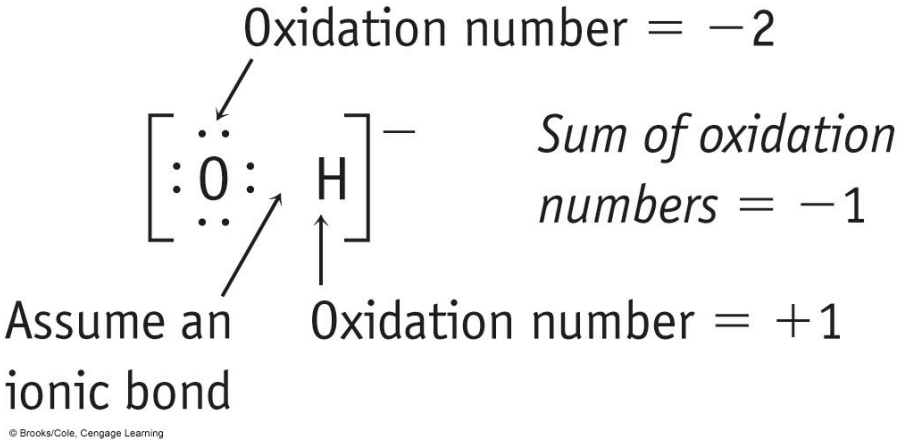
Electrons shared, one to each

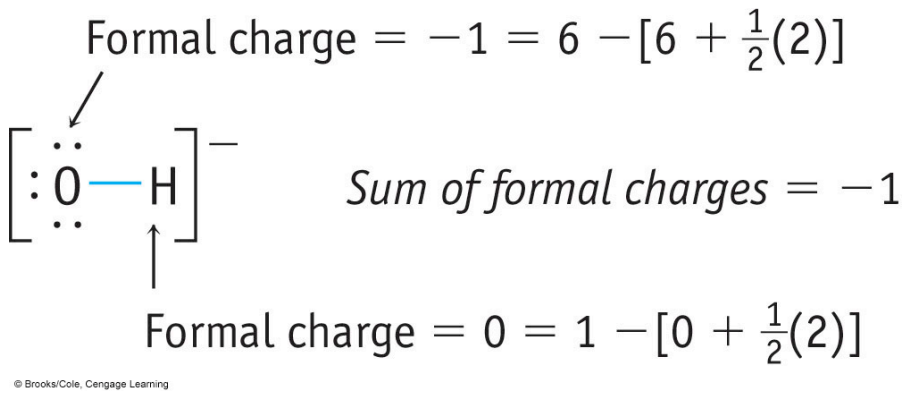
Oxidation Number

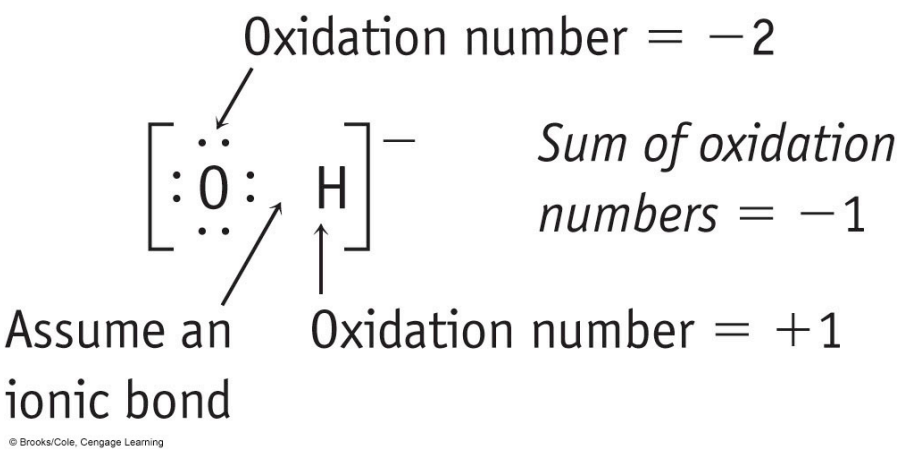
Ionic assumption

Both electrons transferred to the one who wants them more

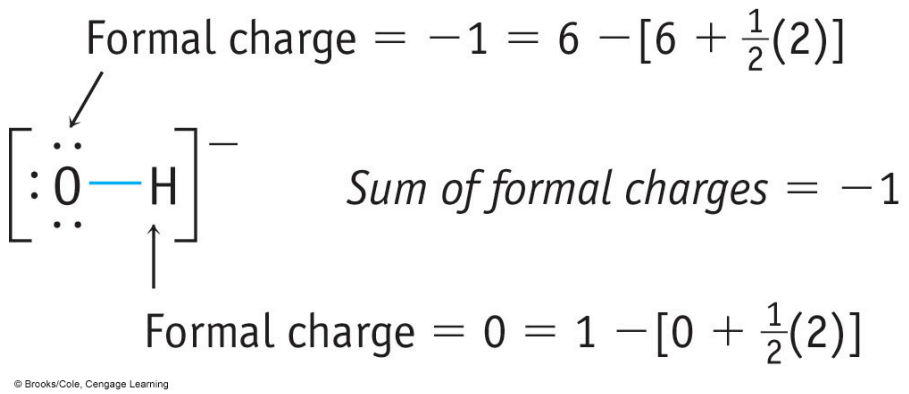


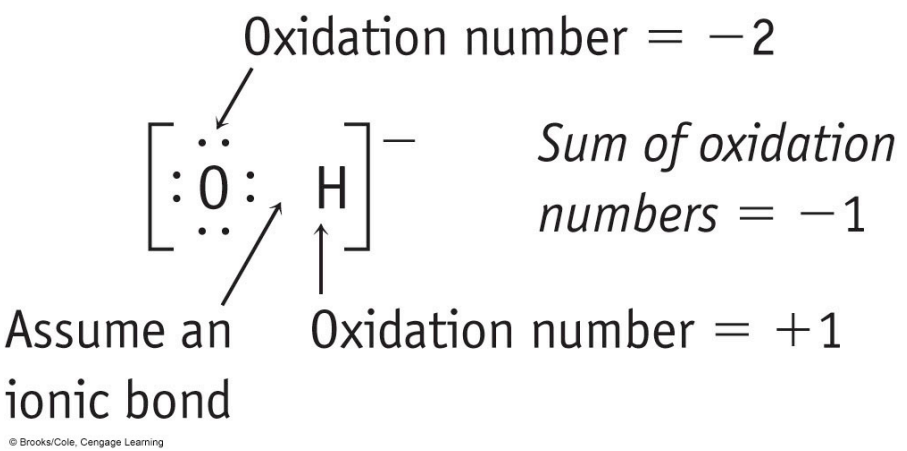




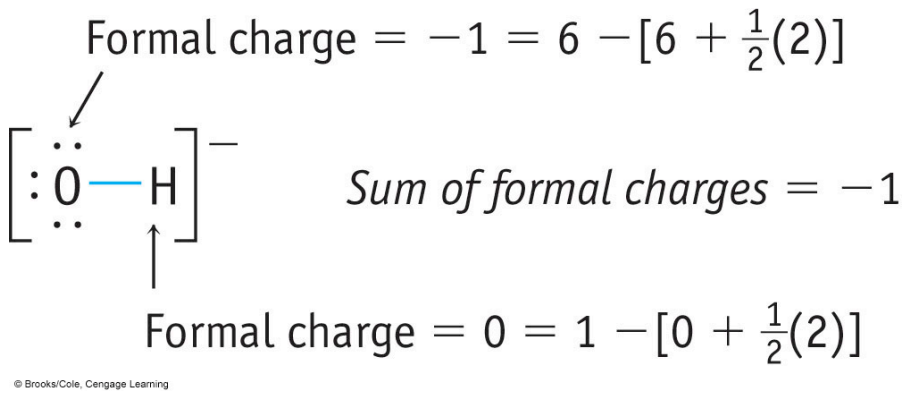


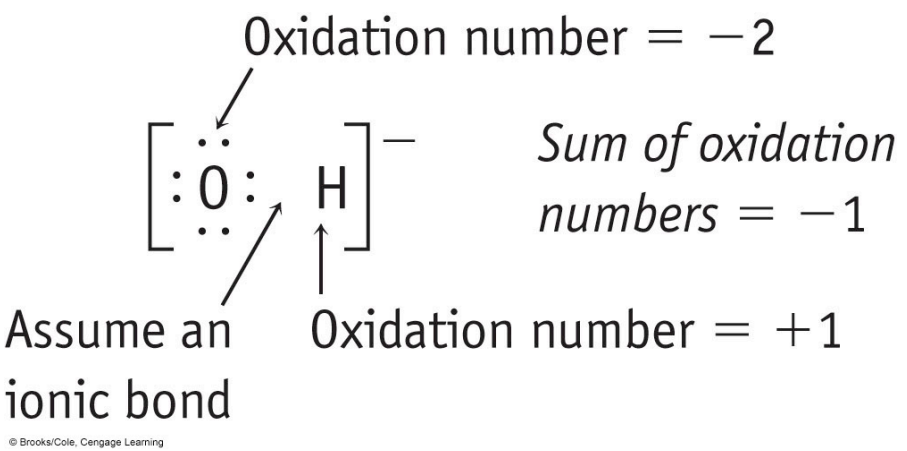
- **Octet Rule** - **double count** shared electrons
  - assumes both atoms get both electrons





- **Octet Rule** - **double count** shared electrons
  - assumes both atoms get both electrons
- **Formal Charge** - ***Evenly*** split electrons in a bond
  - one to one atom, one to the other





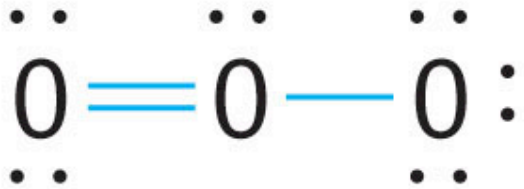
- **Octet Rule** - **double count** shared electrons
  - assumes both atoms get both electrons
- **Formal Charge** - ***Evenly*** split electrons in a bond
  - one to one atom, one to the other
- **Oxidation Number** - ***Unevenly*** split electrons in a bond
  - the atom that wants electrons more, gets both shared electrons (as in ionic bonds). The other one loses out. *An extreme view*.

Back to Octet Rule

Ozone molecule O_3

Alternative Ways of Drawing the Ozone Structure

Double bond on the left:

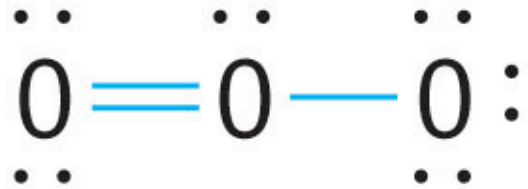


Double bond on the right:

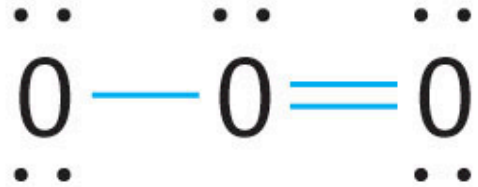
Ozone molecule O_3

Alternative Ways of Drawing the Ozone Structure

Double bond on the left:

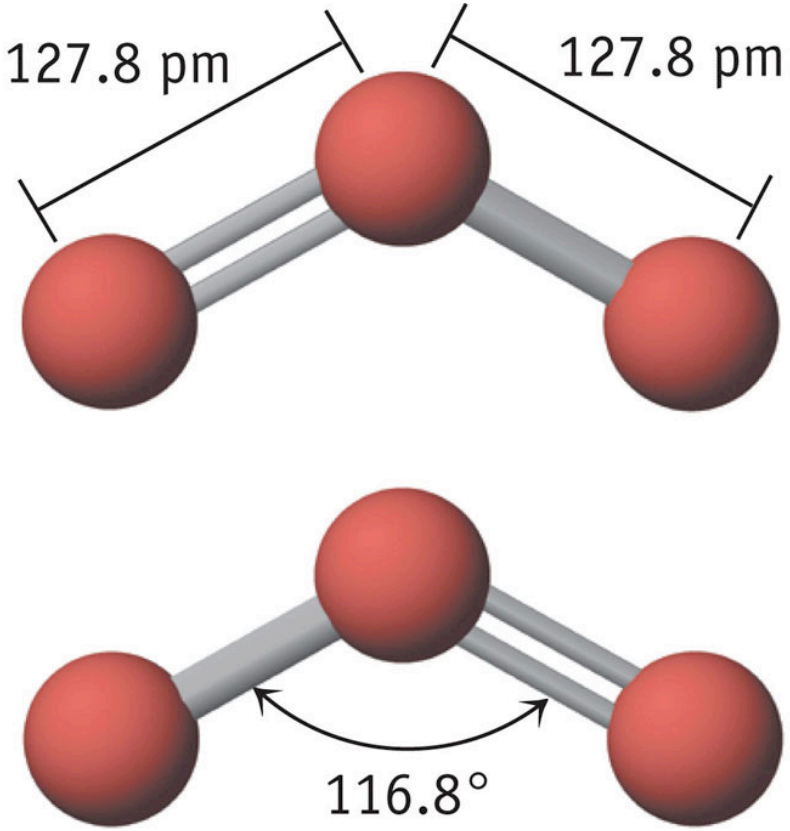


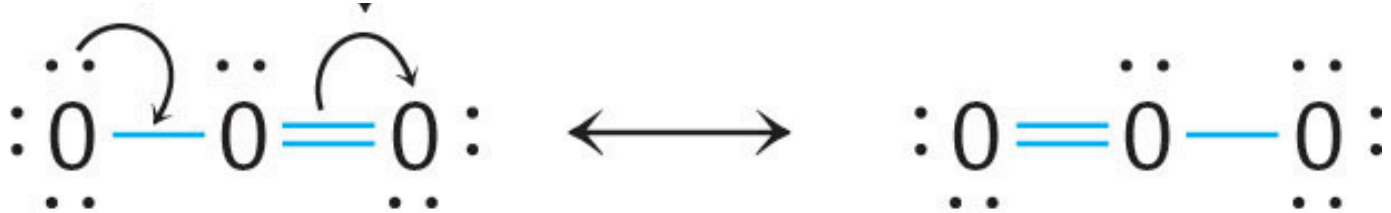
Double bond on the right:



Which side gets the double bond?

Real molecule - equal bond lengths!! (not interconverting)

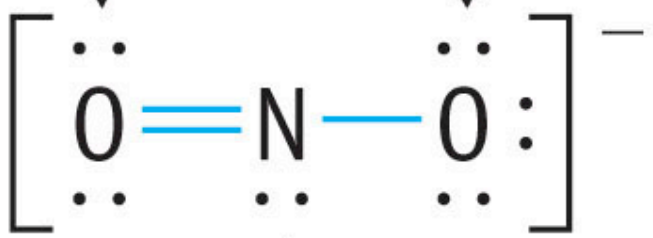




Nitrite anion - NO_2^-

Formal charge = $0 = 6 - [4 + \frac{1}{2}(4)]$

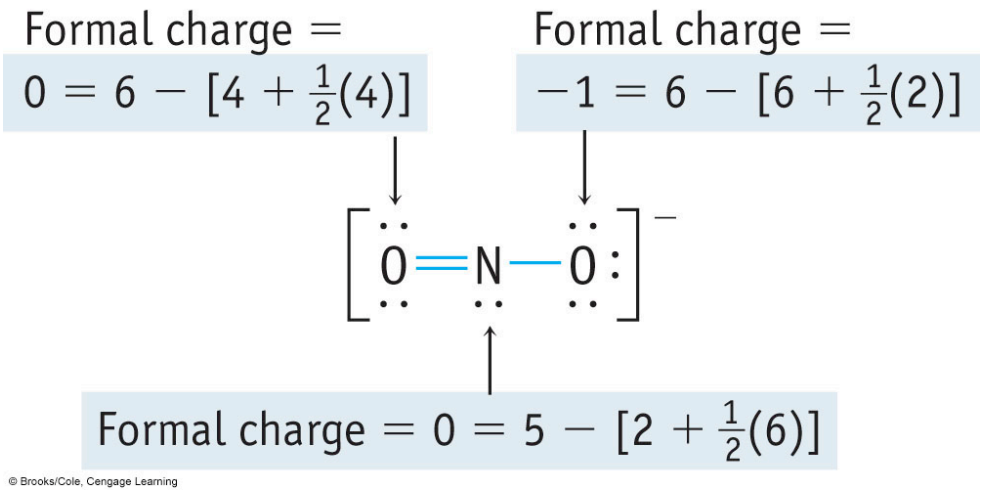
Formal charge = $-1 = 6 - [6 + \frac{1}{2}(2)]$



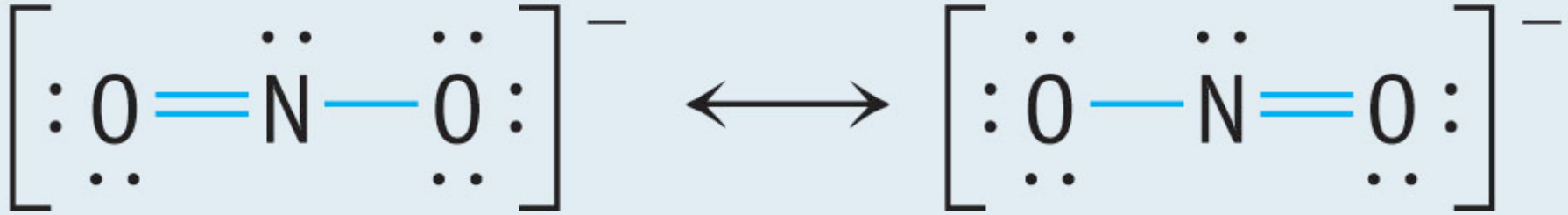
Formal charge = $0 = 5 - [2 + \frac{1}{2}(6)]$

Example 8-4, p. 363

Nitrite anion - NO_2^-



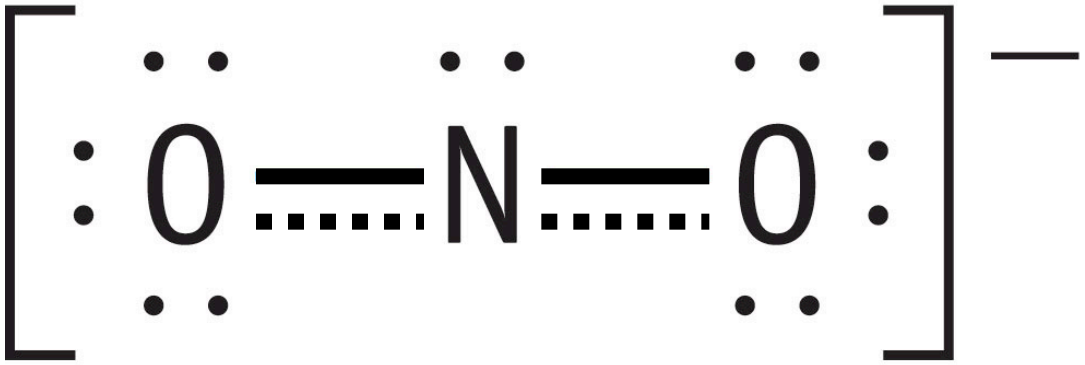
Resonance Structure - two views; neither fully correct



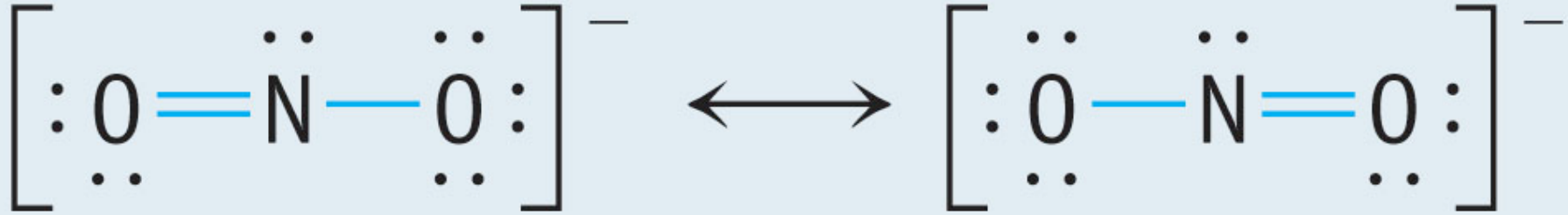
Example 8-4, p. 363

Nitrite anion - NO_2^-

Unified Structure - one view; more correct



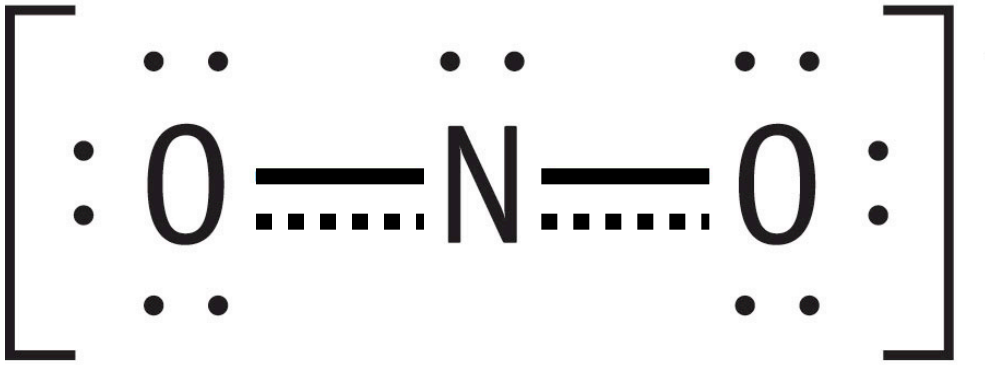
Resonance Structure - two views; neither fully correct



Example 8-4, p. 363

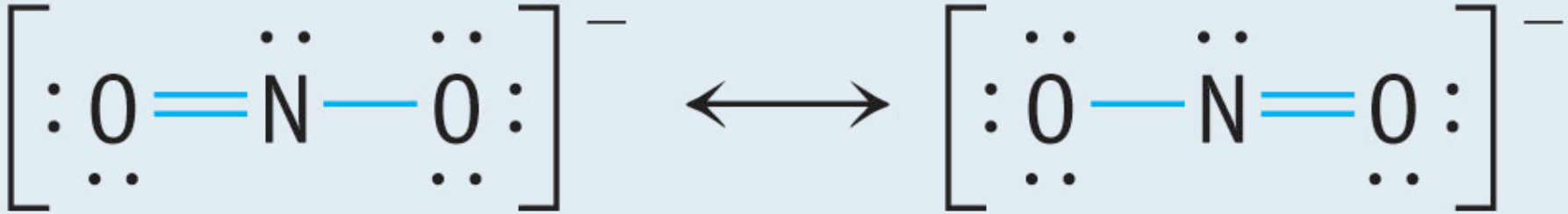
Nitrite anion - NO_2^-

Unified Structure - one view; more correct



But harder to implement the octet rule

Resonance Structure - two views; neither fully correct

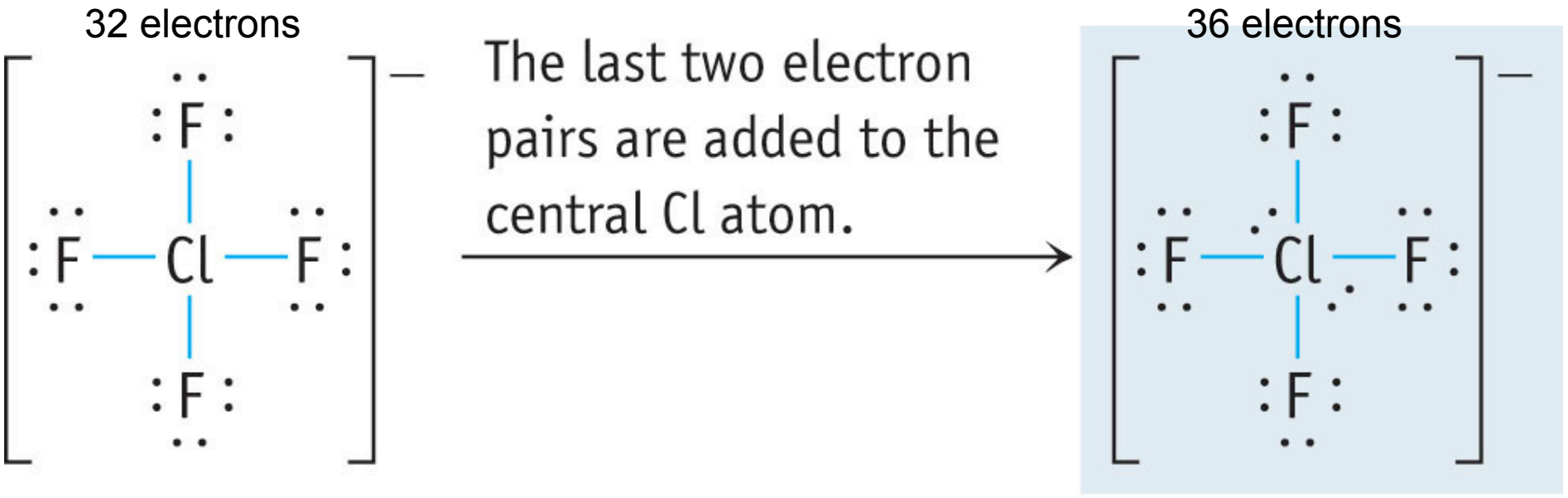


Example 8-4, p. 363

Exceeding the Octet Rule

using near-energy d orbitals

(5x7) +1 = 36 electrons brought to the party



Example 8-5, p. 366

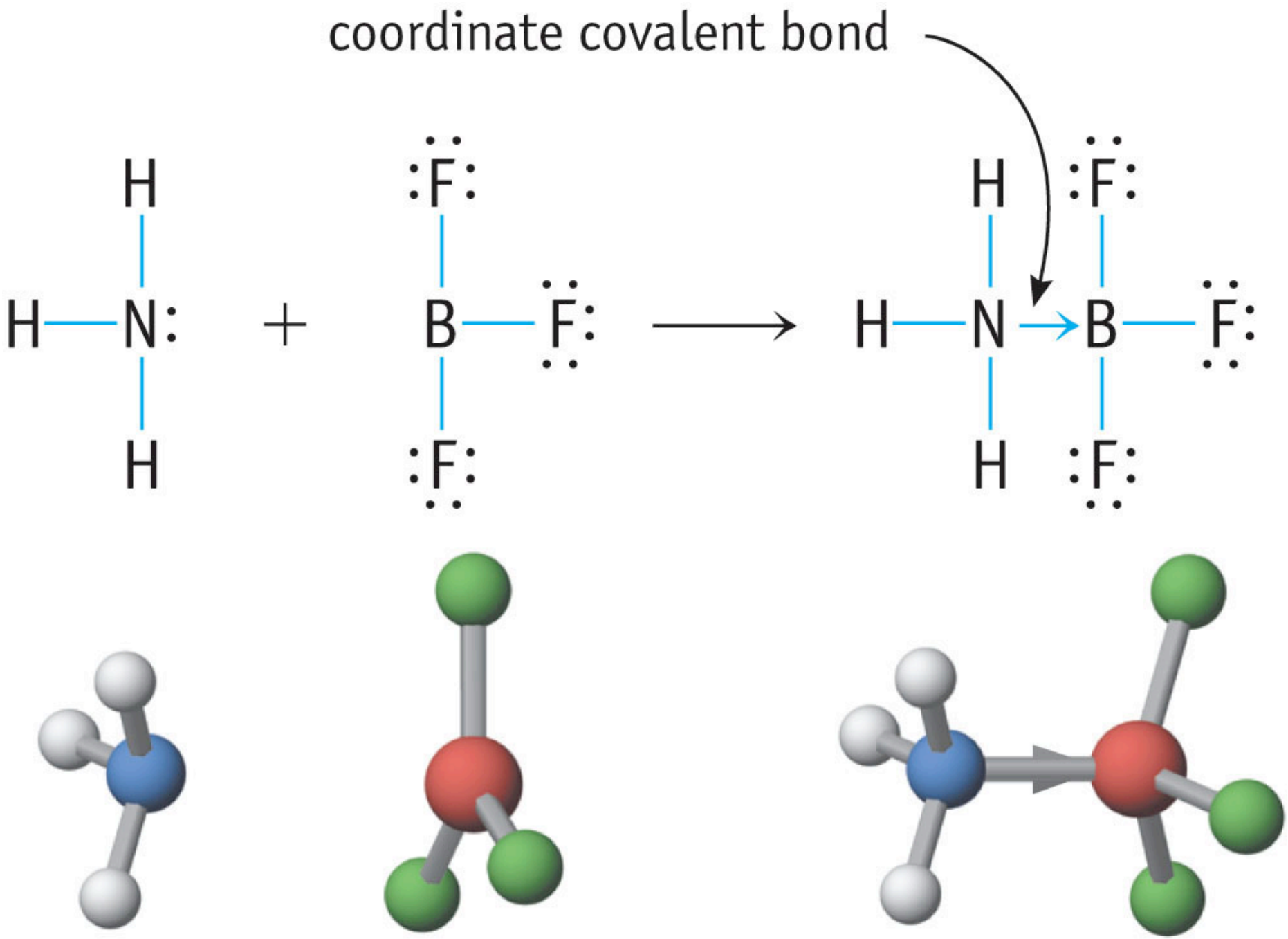
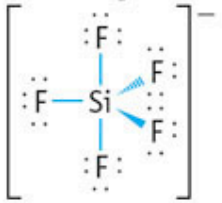
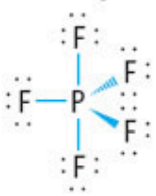
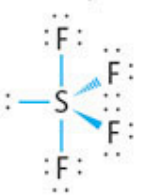
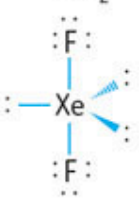
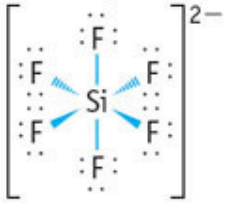
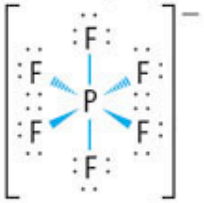
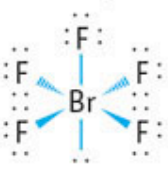


TABLE 8.6 Lewis Structures in Which the Central Atom Exceeds an Octet

Group 4A	Group 5A	Group 6A	Group 7A	Group 8
SiF_5^- 	PF_5 	SF_4 	ClF_3 	XeF_2 
SiF_6^{2-} 	PF_6^- 	SF_6 	BrF_5 	XeF_4