

Pre-AP Chemistry/AP Chemistry
Unit #5—Bonding

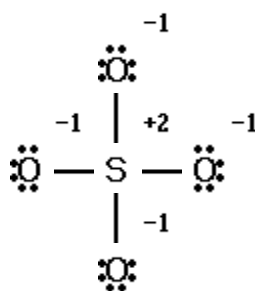
Formal Charges

$$\# \text{ of Assigned Valence Electrons} = \# \text{ Unbonded Valence Electrons} + \left(\frac{1}{2} \times \# \text{ Bonded Valence Electrons} \right)$$

$$\text{Formal Charge} = \# \text{ Valence Electrons} - \# \text{ Assigned Valence Electrons}$$

Total Formal Charge will EQUAL the charge of the molecule or ion.

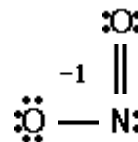
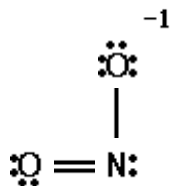
Sulfate, SO_4^{2-}



Number of Assigned Valence Electrons Per Atom						
S	=	0 ve ⁻	+	($\frac{1}{2} \times 8 \text{ ve}^-$)	=	4 ve ⁻
O	=	6 ve ⁻	+	($\frac{1}{2} \times 2 \text{ ve}^-$)	=	7 ve ⁻
O	=	6 ve ⁻	+	($\frac{1}{2} \times 2 \text{ ve}^-$)	=	7 ve ⁻
O	=	6 ve ⁻	+	($\frac{1}{2} \times 2 \text{ ve}^-$)	=	7 ve ⁻
O	=	6 ve ⁻	+	($\frac{1}{2} \times 2 \text{ ve}^-$)	=	7 ve ⁻

	S	O	O	O	O	Total Formal Charge
# ve ⁻	6	6	6	6	6	
# assn ve ⁻	4	7	7	7	7	
Formal Charge	+2	-1	-1	-1	-1	2-

Nitrite, NO_2^-



Number of Assigned Valence Electrons Per Atom					
N	=	2 ve ⁻	+	($\frac{1}{2} \times 6 \text{ ve}^-$)	= 5 ve ⁻
O	=	4 ve ⁻	+	($\frac{1}{2} \times 4 \text{ ve}^-$)	= 6 ve ⁻
O	=	6 ve ⁻	+	($\frac{1}{2} \times 2 \text{ ve}^-$)	= 7 ve ⁻

Number of Assigned Valence Electrons Per Atom					
N	=	2 ve ⁻	+	($\frac{1}{2} \times 6 \text{ ve}^-$)	= 5 ve ⁻
O	=	6 ve ⁻	+	($\frac{1}{2} \times 2 \text{ ve}^-$)	= 7 ve ⁻
O	=	4 ve ⁻	+	($\frac{1}{2} \times 4 \text{ ve}^-$)	= 6 ve ⁻

	N	O	O	Total Formal Charge
# ve ⁻	5	6	6	
# assn ve ⁻	5	6	7	
Formal Charge	0	0	-1	2-

	N	O	O	Total Formal Charge
# ve ⁻	5	6	6	
# assn ve ⁻	5	7	6	
Formal Charge	0	-1	0	1-