## Determining Charges on Monatomic Ions

1. Metals form cations; nonmetals form anions.

2. Main-group metals tend to form cations with charges equal to their group number (North American system).

   Examples: $Na^{+}$ (Group 1A, 1+)
   $Mg^{2+}$ (Group 2A, 2+)
   $Al^{3+}$ (Group 3A, 3+)

3. Nonmetals tend to form anions with charges equal to their group number minus 8.

   Examples: $F^{-}$ (Group 7A, 7 - 8 = -1)
   $O^{2-}$ (Group 6A, 6 - 8 = -2)
   $N^{3-}$ (Group 5A, 5 - 8 = -3)

4. Transition metals and some heavier main group elements can form more than one kind of cation.

   Examples: $Cu^{+}$ & $Cu^{2+}$
   $Fe^{2+}$ & $Fe^{3+}$
   $Co^{2+}$ & $Co^{3+}$
   $Cr^{2+}$ & $Cr^{3+}$
   $Tl^{+}$ & $Tl^{3+}$

5. Ionic charges greater than ±3 are not real. Compounds in which an element might be assigned such high charge are probably molecular (or less commonly, network solids).