

## 3.11: Nomenclature of Molecular Compounds

The nomenclature of simple binary molecular compounds (covalently bonded compounds consisting of only two elements) is slightly more complicated than the nomenclature of ionic compounds because *multipliers* must be used to indicate the ratio of the elements in the molecule; the multiplier *mono* is only used for the second element in a compound.

Further, when you are naming a molecular compound, you must also decide which element should be listed first. In general, elements appearing to the *left* or *lower* in the periodic table are listed first in the name. Once you have decided on the order, the second element is named using the element root and *ide*, just like in ionic compounds. Thus, for  $\text{CCl}_4$ , carbon is to the *left* of chlorine (Group 4A vs. Group 5A), so it is listed first. There are four chlorines, so the multiplier *tetra* is used, and the name is **carbon tetrachloride**. Compounds containing hydrogen are generally an exception, and the hydrogen is listed as the first element in the name. Thus,  $\text{H}_2\text{S}$  would be named using the multiplier *di* to indicate that there are two hydrogens and *mono* to indicate that there is only one sulfur, or, dihydrogen monosulfide.

For the molecule  $\text{SO}_2$ ; they are both Group 6A elements, but sulfur is *lower* in the periodic table (Row 3 vs. Row 2) so it is *first* in the name. There are two oxygens, so the multiplier is *di* and the name is **sulfur dioxide**.

For the molecule  $\text{NO}$ ; nitrogen is to the *left* of oxygen (Group 6A vs. Group 5A) so it is *first* in the name. There is one oxygen, so the multiplier is *mono* and, following the rules, the name would be “nitrogen monooxide”. In this case, however, the second “o” in the name is *dropped* (to allow for easier pronunciation) and the name is shortened to **nitrogen monoxide**. Distinguish this from another oxide of nitrogen,  $\text{N}_2\text{O}_4$ . Again nitrogen is first and needs the multiplier *di*. There are four oxygens, so the multiplier is *tetra*, but once again the multiplier is shortened (again, the “a” is dropped) and the name is **dinitrogen tetroxide**.

### ✓ Example 3.11.1:

Write a correct chemical formula for each of the following molecular compounds:

- Chlorine monofluoride
- Dihydrogen monosulfide
- Carbon tetrabromide
- Bromine

#### Solution

- $\text{ClF}$
- $\text{H}_2\text{S}$
- $\text{CBr}_4$
- $\text{Br}_2$

### ✓ Example 3.11.1:

Write a proper chemical name for each of the following molecular compounds:

- $\text{IF}$
- $\text{PCl}_3$
- $\text{I}_2$
- $\text{N}_2\text{F}_2$

#### Solution

- Iodine monofluoride
- Phosphorus trichloride
- Iodine
- Dinitrogen difluoride

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