Names and formulas of covalent compounds reflect their molecular structure

Binary covalent compound: a compound made up of the atoms of two elements joined by covalent bonds

- Example: sulfur hexafluoride (SF_6)

Figure 2.44: Sulfur hexafluoride (SF_6) is a gas that does not conduct thermal energy well. It is used to insulate double-glazed windows.

Writing Names of Binary Covalent Compounds

- The names of binary covalent compounds have prefixes to indicate how many atoms of are present in one molecule of the compound.
- Mono- is used only for the second element in the name
- No prefix: mono- is implied (example: carbon monoxide)
- When mono- comes before -oxide, an “o” is dropped (monoxide, not monooxide)

Table 2.8 Prefixes Used to Name Binary Covalent compounds

Prefix	Number	Prefix	Number
mono-	1	hexa-	6
di-	2	hepta-	7
tri-	3	octa-	8
tetra-	4	nona-	9
penta-	5	deca-	10

Sample Problem: Naming a Binary Covalent Compound (Step 1&2)

Problem:

What is the name of NO_2?

Step 1: Name the leftmost element in the formula first.

- The first element is N (nitrogen).

Step 2: Name the second element, making sure the name ends with the suffix *–ide*.

- The second element is O (oxygen), which becomes oxide.

Problem:

What is the name of NO_2?

Step 3: Add a prefix to each element's name to indicate the number of atoms of each element in a molecule of a compound. If the first element would get the prefix *mono*, do no include that prefix.

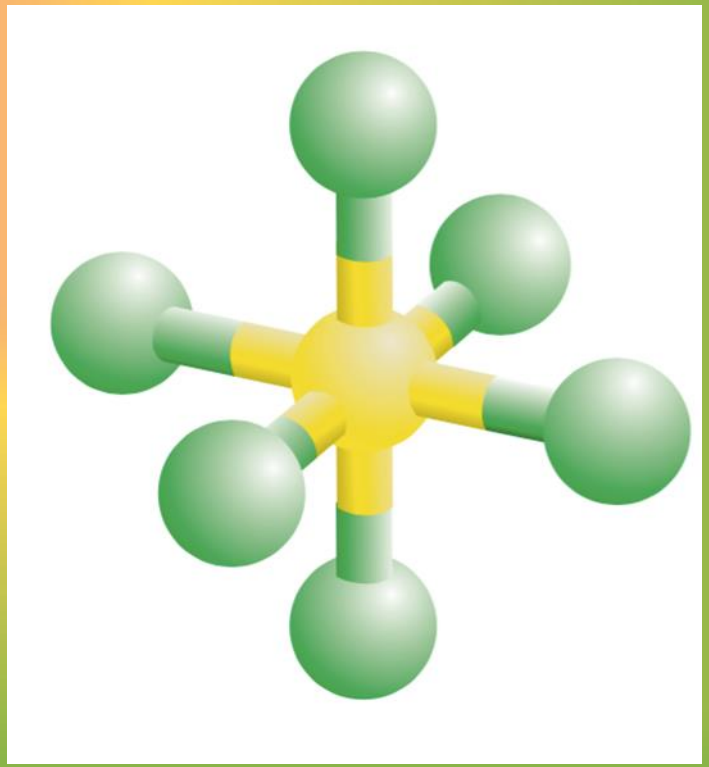
- The first element is nitrogen. There is 1 nitrogen atom.
- The second element is oxygen, which becomes oxide. There are 2 oxygen atoms. Add the prefix *di-* to oxide.
- Therefore, the name of NO_2 is nitrogen dioxide.

Writing Formulas of Binary Covalent Compounds

Chemical formulas of binary covalent compounds indicate **how many** atoms of each element are present in a single molecule of a compound

Example: SF_6 (sulfur hexafluoride)

1. 1 sulfur atom
2. 6 fluoride atoms



Sample Problem: Writing Formulas for Binary Covalent Compounds (Step 1)

Problem:

What is the chemical formula for dinitrogen tetroxide?

Step 1: Write the element symbols in the order that they appear in the name.

- Look at the periodic table to find the element symbols.
- The first element is nitrogen, N.
- The second element is oxygen (oxide), O.

Problem:

What is the chemical formula for dinitrogen tetroxide?

Step 2: Add subscripts based on the prefixes used in the name.

- The prefix *di* from dinitrogen tells you that there are 2 nitrogen atoms
- The prefix *tetr-* from tetroxide tells you that there are 4 oxygen atoms.
- Therefore, the formula of dinitrogen tetroxide is N_2O_4.

Discussion Questions

1. What does the formula for a covalent compound tell you about the compound?

2. Identify two problems with the name mononitrogen monooxide for the compound NO and correct them.

3. Sketch a model of a molecule of carbon dioxide, CO_2, and carbon monoxide, CO.

   How do the names and formulas communicate the difference between these compounds?

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