Binary covalent compound $A_aB_b$

Nonmetallic elements

Subscripts (may be absent)
Common Names

- H$_2$O, water
- NH$_3$, ammonia
- CH$_4$, methane
- C$_2$H$_6$, ethane
- C$_3$H$_8$, propane
- C$_4$H$_{10}$, butane
- C$_5$H$_{12}$, pentane
- C$_6$H$_{14}$, hexane
• If the subscript for the first element is greater than one, indicate the subscript with a prefix.
  – We do not write mono- on the first name.
  – Leave the "a" off the end of the prefixes that end in "a" and the “o” off of mono- if they are placed in front of an element that begins with a vowel (oxygen or iodine).
| Prefixes |  |
|----------|  |
| mon(o)   | hex(a) |
| di       | hept(a) |
| tri      | oct(a) |
| tetr(a)  | non(a) |
| pent(a)  | dec(a) |
Nitrogen Oxide
Names

- $\text{N}_2\text{O}_3$ – name starts with $di$
- $\text{N}_2\text{O}_5$ – name starts with $di$
- $\text{NO}_2$ – no initial prefix
- $\text{NO}$ – no initial prefix
Naming Binary Covalent Compounds

• Follow the prefix with the name of the first element in the formula.

- $\text{N}_2\text{O}_3$ – dinitrogen
- $\text{N}_2\text{O}_3$ – dinitrogen
- $\text{NO}_2$ – nitrogen
- $\text{NO}$ – nitrogen
Naming Binary Covalent Compounds

• Write a prefix to indicate the subscript for the second element. (Remember to leave the “o” off of mono- and the “a” off of the prefixes that end in “a” when they are placed in front of a name that begins with a vowel.)

- \( \text{N}_2\text{O}_3 \) – dinitrogen tri
- \( \text{N}_2\text{O}_5 \) – dinitrogen pent
- \( \text{NO}_2 \) – nitrogen di
- \( \text{NO} \) – nitrogen mon
Naming Binary Covalent Compounds

• Write the root of the name of the second symbol in the formula. (See the next slide.)
  
  – \( \text{N}_2\text{O}_3 \) – dinitrogen triox
  – \( \text{N}_2\text{O}_5 \) – dinitrogen pentox
  – \( \text{NO}_2 \) – nitrogen diox
  – \( \text{NO} \) – nitrogen monox
Roots of Nonmetals

H hydr-
C carb-
N nitr-
P phosph-
O ox-
S sulf-
Se selen-
F fluor-
Cl chlor-
Br brom-
I iod-
• Add -ide to the end of the name.
  – $\text{N}_2\text{O}_3$ – *dinitrogen trioxide*
  – $\text{N}_2\text{O}_5$ – *dinitrogen pentoxide*
  – $\text{NO}_2$ – *nitrogen dioxide*
  – NO – *nitrogen monoxide*
Br and O both represent nonmetallic elements, so this formula represents a binary covalent compound.

- di
- dibromine
- dibromine hept
- dibromine heptoxide
• P and Cl both represent nonmetallic elements, so this formula represents a binary covalent compound.
• No prefix at the beginning
• phosphorus
• phosphorus tri
• phosphorus trichlor
• phosphorus trichloride
• C and O both represent nonmetallic elements, so this formula represents a binary covalent compound.

• No prefix at the beginning
• carbon
• carbon mon
• carbon monox
• carbon monoxide
H and S both represent nonmetallic elements, so this formula represents a binary covalent compound.

- di
- dihydrogen
- dihydrogen mono
- dihydrogen monosulf
- dihydrogen monosulfide
- dihydrogen sulfide or hydrogen sulfide
The following binary covalent compounds are often named without prefixes:

- HF – hydrogen fluoride
- HCl – hydrogen chloride
- HBr – hydrogen bromide
- HI – hydrogen iodide
- $\text{H}_2\text{S}$ – hydrogen sulfide
• N and H both represent nonmetallic elements, so this formula represents a binary covalent compound.
• Memorized name - ammonia
Forms of Binary Covalent Names

- prefix(name of nonmetal) prefix(root of name of nonmetal)ide
  (for example, dinitrogen pentoxide)
- or (name of nonmetal) prefix(root of name of nonmetal)ide
  (for example, carbon dioxide)
- or (name of nonmetal) (root of nonmetal)ide
  (for example, hydrogen fluoride)
Writing Binary Covalent Formulas

• If the name is a memorized name that is not a systematic name, just write the memorized formula.

• Write the symbols for the elements in the order mentioned in the name.

• Write subscripts indicated by the prefixes. If the first part of the name has no prefix, assume it is mono-. 
Converting from Names to Formulas

- dinitrogen tetroxide
  - $\text{N}_2\text{O}_4$
- phosphorus tribromide
  - $\text{PBr}_3$
- hydrogen iodide
  - HI
- Methane
  - $\text{CH}_4$
Converting between Binary Covalent Formulas and Names

- There is a tool on the textbook’s website that will allow you to practice this task.

https://preparatorychemistry.com/binary_covalent_nomenclature_Canvas.html