

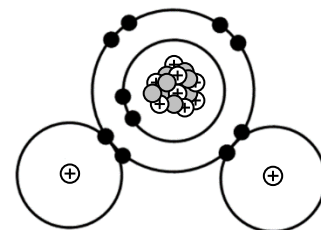
Covalent naming and formulas

Chemical reactions occur when atoms gain, lose, or share electrons.

Sharing electrons creates a covalent bond

Nonmetals can share electrons to form a covalent bond.

This creates a molecule.



Determine if a compound is ionic or covalent.

What elements do covalent compounds contain?

Covalent compounds contain only non-metals.

What elements do ionic compounds contain?

Ionic compounds contain a metal and a non-metal.

A periodic table of elements is shown. Two arrows originate from the left side of the table and point towards the right side. The first arrow starts at the bottom left (near Francium) and points towards the top right (near Helium). The second arrow starts at the middle left (near Calcium) and points towards the middle right (near Gallium). The periodic table includes elements from Hydrogen (H) to Oganesson (Og), with some elements abbreviated as 'He', 'Ne', 'Ar', 'Kr', 'Xe', 'Rn', 'At', 'Rf', 'Ta', 'W', 'Re', 'Os', 'Ir', 'Pt', 'Au', 'Hg', 'Tl', 'Pb', 'Bi', 'Po', 'At', 'Rn', 'Fr', 'Ra', 'Ac', 'Th', 'Pa', 'U', 'Np', 'Pu', 'Am', 'Cm', 'Bk', 'Cf', 'Es', 'Fm', 'Md', 'No', 'Lr', 'Ta', 'W', 'Re', 'Os', 'Ir', 'Pt', 'Au', 'Hg', 'Tl', 'Pb', 'Bi', 'Po', 'At', 'Rn', 'Fr', 'Ra', 'Ac', 'Th', 'Pa', 'U', 'Np', 'Pu', 'Am', 'Cm', 'Bk', 'Cf', 'Es', 'Fm', 'Md', 'No', 'Lr'.

Decide whether the compounds on your notes are ionic or covalent.

$$\text{CO}_2 \text{ } \underline{\text{C}}$$
$$\text{N}_2\text{O} \quad \underline{\text{C}}$$

PtO I

$$\text{HgCl}_2 \quad \underline{\underline{\text{I}}}$$
$$\text{SiO}_2 \text{---} \text{C}$$

SrBr_2 II

There are 7 elements that exist in nature as *diatomic* molecules.

What elements exist as diatomic molecules?

$H_2, N_2, O_2, F_2, Cl_2, Br_2, I_2$

There are millions of covalent compounds. These can be classified into many different types of Compounds. Each type of compound has a different set of rules for naming.

Binary Covalent Compounds

What does the word binary mean? Binary means 2.

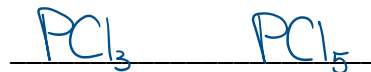
Binary covalent compounds are between 2 different non-metals.

Nonmetals can share electrons in many different ways. This means that two nonmetals can create multiple compounds together.

carbon and oxygen



phosphorous and chlorine



nitrogen and oxygen

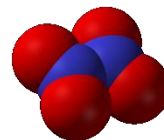


Each of these contains a different ratio of elements. Because of this, we have to make sure that the name of the compound explains the correct ratio.

To show the correct ratio of elements, we use prefixes.

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

Steps for Naming Binary Covalent Compounds



Example: N_2O_4

Step 1: Write the name of the first non-metal.

Step 2: Write the name of the second nonmetal changing its ending to -ide.

Step 3: Add prefixes to specify how many of each element are present.

Answer: dinitrogen tetroxide

Rules for Using Prefixes

Rule 1: Prefixes are only for BINARY COVALENT compounds or greater.

Rule 2: The prefix mono- is never used on the first element of a binary covalent compound. Without a prefix it is assumed that there is only 1.

Example: CO_2 is carbon dioxide, and not monocarbon dioxide.

Rule 3: Remove the -o or -a from a prefix before adding it to non-metal starting with a vowel.

Example: CO is carbon monoxide, and not carbon monooxide.

How would you write each of the prefixes in front of oxide?

Remember: Remove the -o or -a from a prefix before adding it to oxide. Leave -i alone.

mono- monoxide

di- dioxide

tri- trioxide

tetra- tetroxide

penta- pentoxide

hexa- hexoxide

hepta- heptoxide

octa- octoxide

nona- nonoxide

deca- decoxide

Name the binary covalent compounds.

CO_2 : carbon dioxide

CS_2 : carbon disulfide

PBr_3 : phosphorous tribromide

PBr_5 : phosphorous pentabromide

P_2S_5 : diphosphorous pentasulfide

N_2S : dinitrogen monosulfide

SiS_2 : silicon disulfide

NBr_3 : nitrogen tribromide

N_2Cl_4 : dinitrogen tetrachloride

Because of the prefixes, it is very easy to go from the name of a binary covalent compound to its formula.

Example: dinitrogen tetrafluoride

Step 1: Write the symbol of the first nonmetal and the subscript that matches the prefix.

Step 2: Write the symbol of the second nonmetal and the subscript that matches the prefix.

Answer: N_2F_4

Write the formulas of the binary covalent compounds in your notes.

What is the formula of each of the binary covalent compounds named below.

carbon tetrachloride CCl_4

phosphorous pentachloride PCl_5

dinitrogen monoxide N_2O

carbon monosulfide CS

boron trihydride BH_3

disulfur hexabromide S_2Br_6

silicon disulfide SiS_2

phosphorous triiodide PI_3

nitrogen trichloride NCl_3

iodine heptafluoride IF_7

dinitrogen tetroxide N_2O_4

phosphorous trichloride PCl_3

carbon monoxide CO

iodine monochloride ICl

tetrasulfur tetranitride S_4N_4

dihydrogen monoxide H_2O

chlorine pentafluoride ClF_5

nitrogen dioxide NO_2

Once you decide if a compound is ionic or covalent you know whether or not to use prefixes.

Only COVALENT COMPOUNDS use PREFIXES!

Do NOT make the mistake of using prefixes with ionic compounds. You will need to be able to make this choice in upcoming assessments!