

Unit 5 - Nomenclature

Nomenclature of:

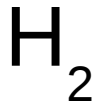
- Diatomic molecules
- Covalent Compounds
- Ionic Compounds
- Acids

Competencies

The student will be able to:

- state which elements occur as diatomic molecules and write the formulas of these molecules.
- name cations and anions derived from parent atoms.
- **predict the formula of an ionic compound, given the name of an ionic compound.**
- define binary compounds.
- **write formulas and give names for binary compounds containing only non-metals.**
- **write formulas and names for binary compounds containing a metal and a non-metal.**
- **write formulas and names for ionic compounds containing the following polyatomic ions: NH_4^+ , NO_2^- , NO_3^- , SO_3^{2-} , SO_4^{2-} , OH^- , PO_4^{3-} , CO_3^{2-} , HCO_3^- , $\text{C}_2\text{H}_3\text{O}_2^-$**
- **name an oxy-acid given the formula of the acid and vice versa.**

Diatomic Molecules



Have



No



Fear



Of



Ice



Cold



Beer



Image: "Ice Fresh" by Falk Lademann
<https://www.flickr.com/photos/coreforce/5380946483/>
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Covalent Compounds

Covalent Compounds: - Composed of two or more non-metals
- Electrons are shared

Naming: (Prefix*) First Non-Metal + (Prefix) Second Non-Metal + ide

* do not write „mono“ for the first non-metal

Prefix: Greek numbers indicating the number of atoms of each element

Examples: N_2O

tetraphosphorus trisulfide

CO_2

carbon tetrachloride

Greek numbers

1	mono
2	di
3	tri
4	tetra
5	penta
6	hexa
7	hepta
8	octa

→ Do Unit V – Problem 1

Ionic Compounds

Ionic Compounds:

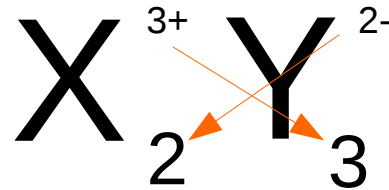
- Composed of anions and cations
- Electrons are transferred

Naming: Cation (Charge*) + Anion (+ ide**)

* the charge (roman numerals) is only stated for metals that can form ions with different charges [In [this](#) class: all metals except those that do not belong to Group 1A and 2A, excluding aluminium (3+), zinc (2+) and silver (1+)]

** do not add +ide to Polyatomic Anions (see next slides)

Number of ions of each element:



Examples: NaCl

potassium sulfide

Al_2O_3

Gold (III) chloride

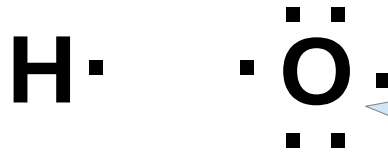
$FeCl_2$

Roman numerals

1	I
2	II
3	III
4	IV
5	V
6	VI
7	VII
8	VIII

Review : Covalent compound

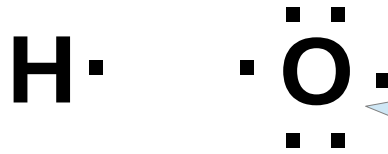
Poor me, I do not look like a noble gas.



Lets share some electrons and pretend that we are noble gases. - At least our electron configuration will look so.

Review : Covalent compound

Poor me, I do not look like a noble gas.



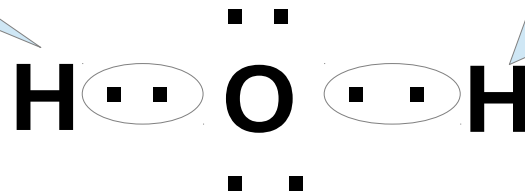
Lets share some electrons and pretend that we are noble gases. - At least our electron configuration will look so.



That works for me!



I look like the Noble Gas Helium!

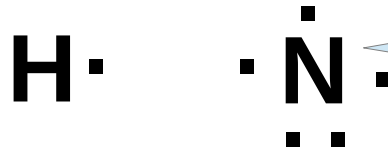


Look at my electrons, they look like those of Neon!



Review : Covalent compound

Oh no, I don't look like a noble gas!

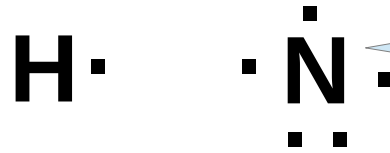


Don't worry, oxygen showed me a trick:
- let's share !

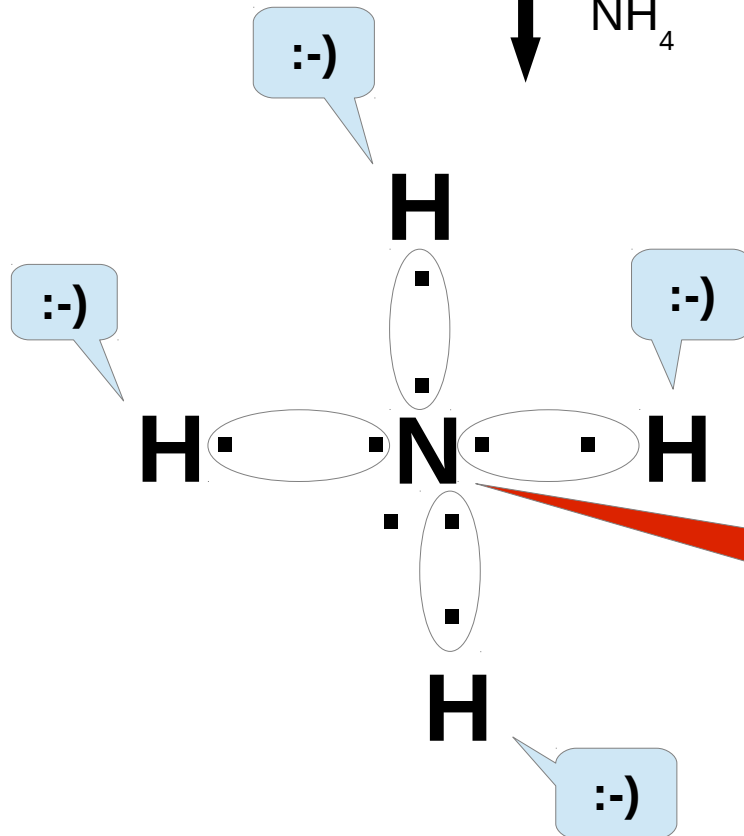


Review : Covalent compound

Oh no, I don't look like a noble gas!



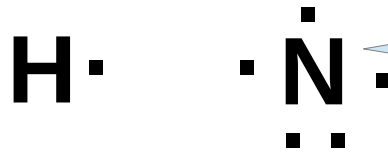
Don't worry, oxygen showed me a trick:
- let's share !



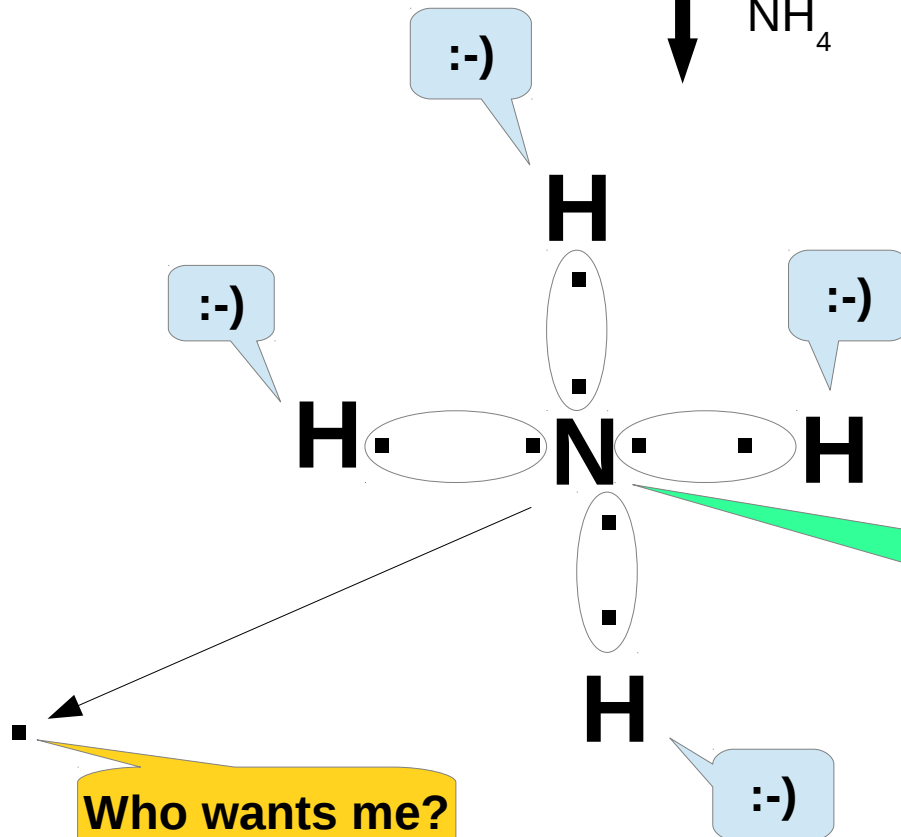
1, 2, 3 ... **9**
Wait, we have
a problem here !!!

Review : Covalent compound

Oh no, I don't look like a noble gas!



Don't worry, oxygen showed me a trick:
- let's share !



Much better, although
we form a polyatomic
ion now!

Who wants me?

Polyatomic Ions

Polyatomic Ions: A group of atoms (covalent bonds) with an ionic charge

List of Polyatomic Ions:

NH_4^+	ammonium
NO_2^{1-}	nitrite
NO_3^{1-}	nitrate
SO_3^{2-}	sulfite
SO_4^{2-}	sulfate
HCO_3^{1-}	bicarbonate
...	

→ Names and charges need to be memorized

Hints: Less oxygen → ite
 More oxygen → ate
 If hydrogen is involved → bi-

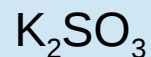
→ Polyatomic ions do form ionic compound with other ions

Examples:



iron(III) bicarbonate

ammonium sulfate

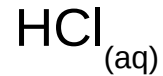


Acids

Acids: Compounds in aqueous solution formed by hydrogen and an anion (except hydroxide)


Naming: The anion ends in +ide : hydro + anion + ic acid
The anion ends in +ate: anion + ic acid
The anion ends in +ite: anion + ous acid

Examples:



sulfuric acid

Don't forget to find the correct number of hydrogen for the formula!



Overview

Covalent

(Prefix*) First Non-Metal + (Prefix) Second Non-Metal + ide

* do not write „mono“ for the first non-metal. Use Greek numbers.

Ionic

Cation (Charge*) + Anion (+ ide**)

* the charge (roman numerals) is only stated for metals that can form ions with different charges

** do not add +ide to Polyatomic Anions

Acids

“ionic compounds”
with hydrogen in aqueous
solution

Anion	+ide	→	hydro + anion + ic acid
	+ate	→	anion + ic acid
	+ite:	→	anion + ous acid

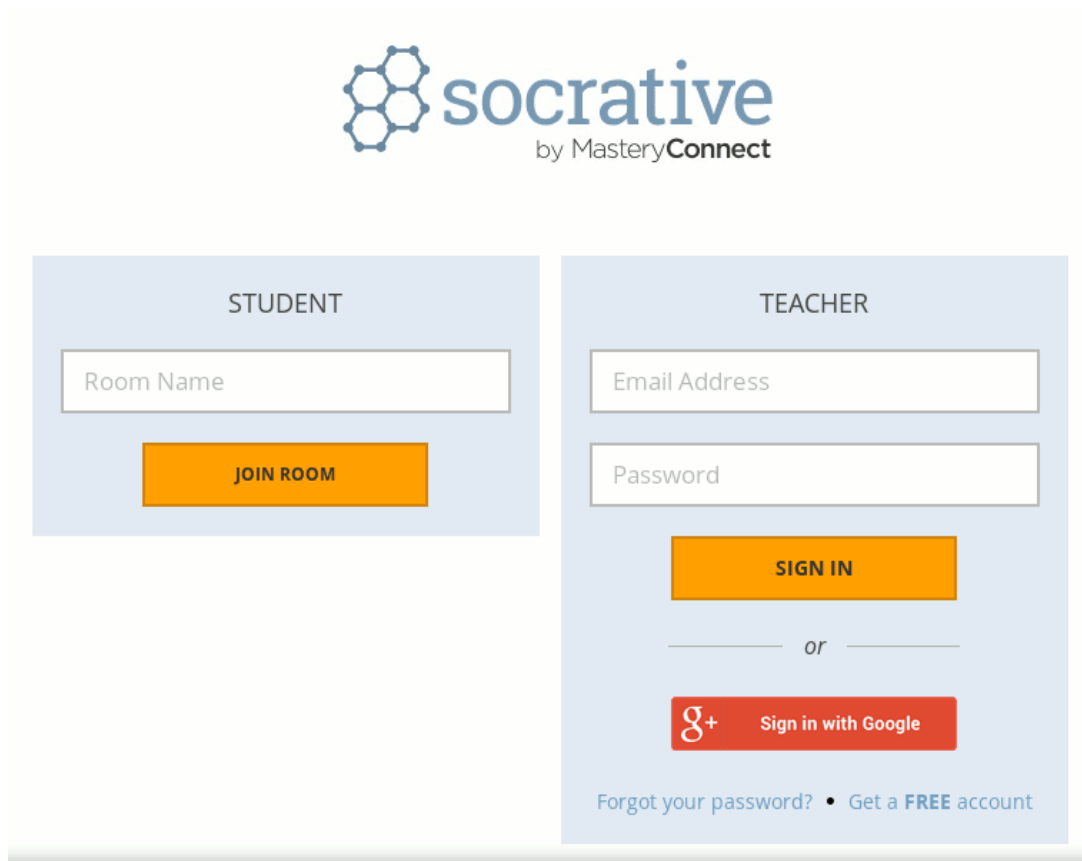
Don't forget that there is hydrogen in the formula!

→ Do Unit V – Problem 2-4

Review

Clicker Review Activity : Sec 4 – Nomenclature

<http://b.socrative.com>



The image shows the Socrative login interface. At the top, there is the Socrative logo, which consists of a cluster of blue hexagons followed by the text "socrative" in a blue sans-serif font, and "by MasteryConnect" in a smaller, grey font below it. Below the logo, there are two main sections: "STUDENT" and "TEACHER".

The "STUDENT" section is on the left and contains a light blue box with a white input field labeled "Room Name" and an orange button labeled "JOIN ROOM" below it.

The "TEACHER" section is on the right and contains a light blue box with a white input field labeled "Email Address" and another white input field labeled "Password" below it. Underneath the password field is an orange button labeled "SIGN IN". Below the "SIGN IN" button is the word "or" flanked by horizontal lines. Underneath that is a red button with the Google+ logo and the text "Sign in with Google". At the bottom of the teacher section, there is a link that says "Forgot your password? • Get a **FREE** account".

Additional Resources

- Chemical Nomenclature, OpenStax „College Chemistry“
<http://cnx.org/contents/havxkyvS@9.124:ZNqrI3I1@5/Chemical-Nomenclature>
- Naming Covalent Compounds, Brightstorm on Youtube
https://youtu.be/VokWJy_jpAc
- Naming Ionic Compounds, Brightstorm on Youtube
<https://youtu.be/7Lfc6jpp1WQ>
- Polyatomic Ions, Tyler deWitt on Youtube
<https://youtu.be/MJZeZvDxcx8>