Unit 5 - Nomenclature

Nomenclature of :

- **Diatomic molecules**
- **Covalent Compounds**
- **Ionic Compounds**
- **Acids**

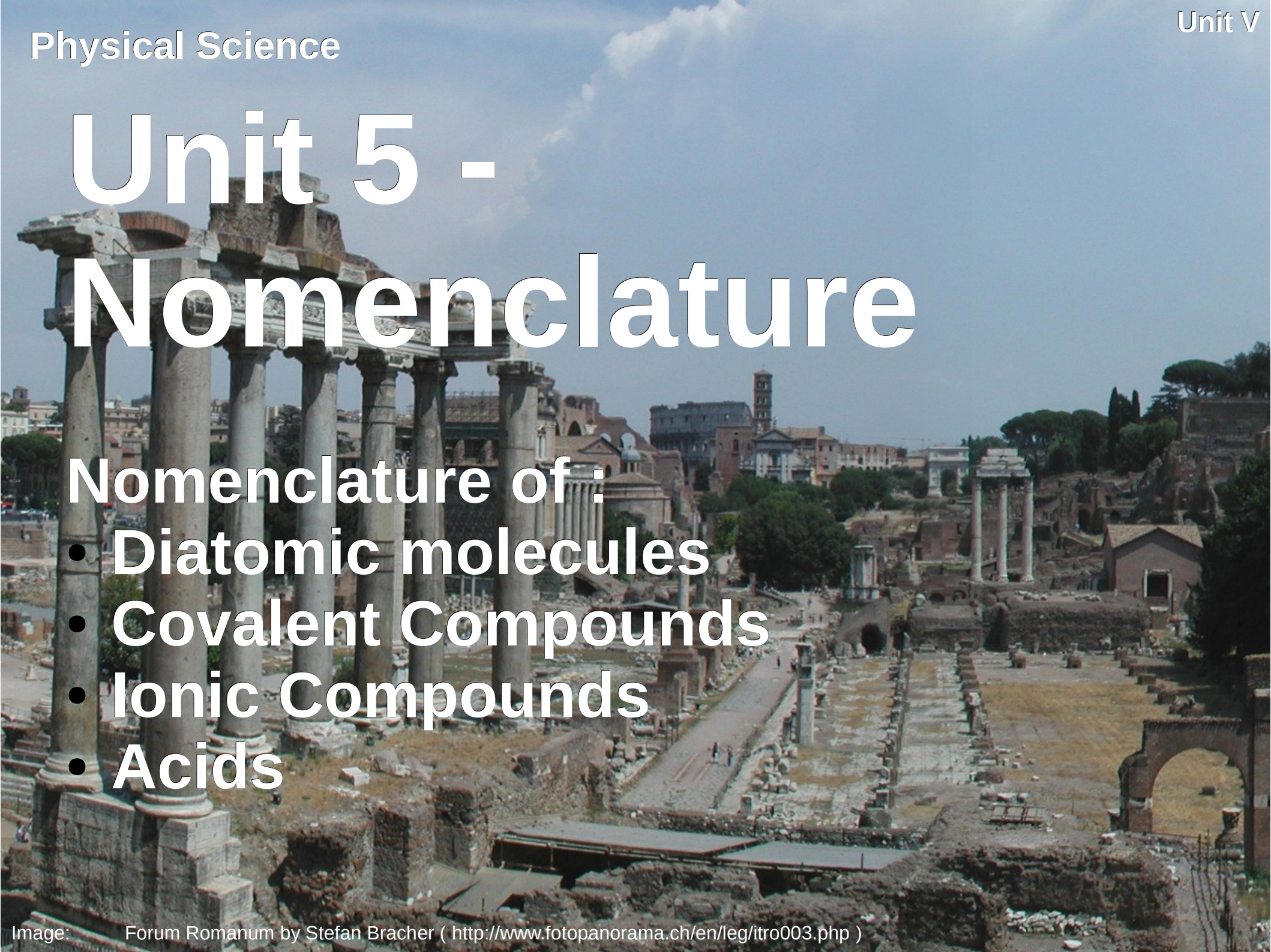


Image: Forum Romanum by Stefan Bracher (http://www.fotopanorama.ch/en/leg/itro003.php)

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^-, $C_2H_3O_2^-$
- **name an oxy-acid given the formula of the acid and vice versa.**

Diatomic Molecules

H_2	**H**ave
N_2	**N**o
F_2	**F**ear
O_2	**O**f
I_2	**I**ce
Cl_2	**Cl**d
Br_2	**Br**er

Image: “Ice Fresh” by Falk Lademann
https://www.flickr.com/photos/coreforce/5380946483/

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

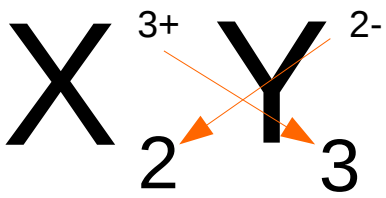
Ionic Compounds: - Composed of anions and cations
- Electrons are transferred

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

$FeCl_2$

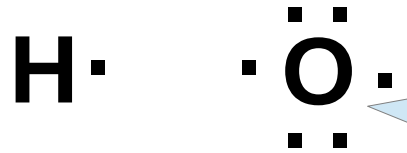
Roman numerals

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

Stefan Bracher

Review : Covalent compound

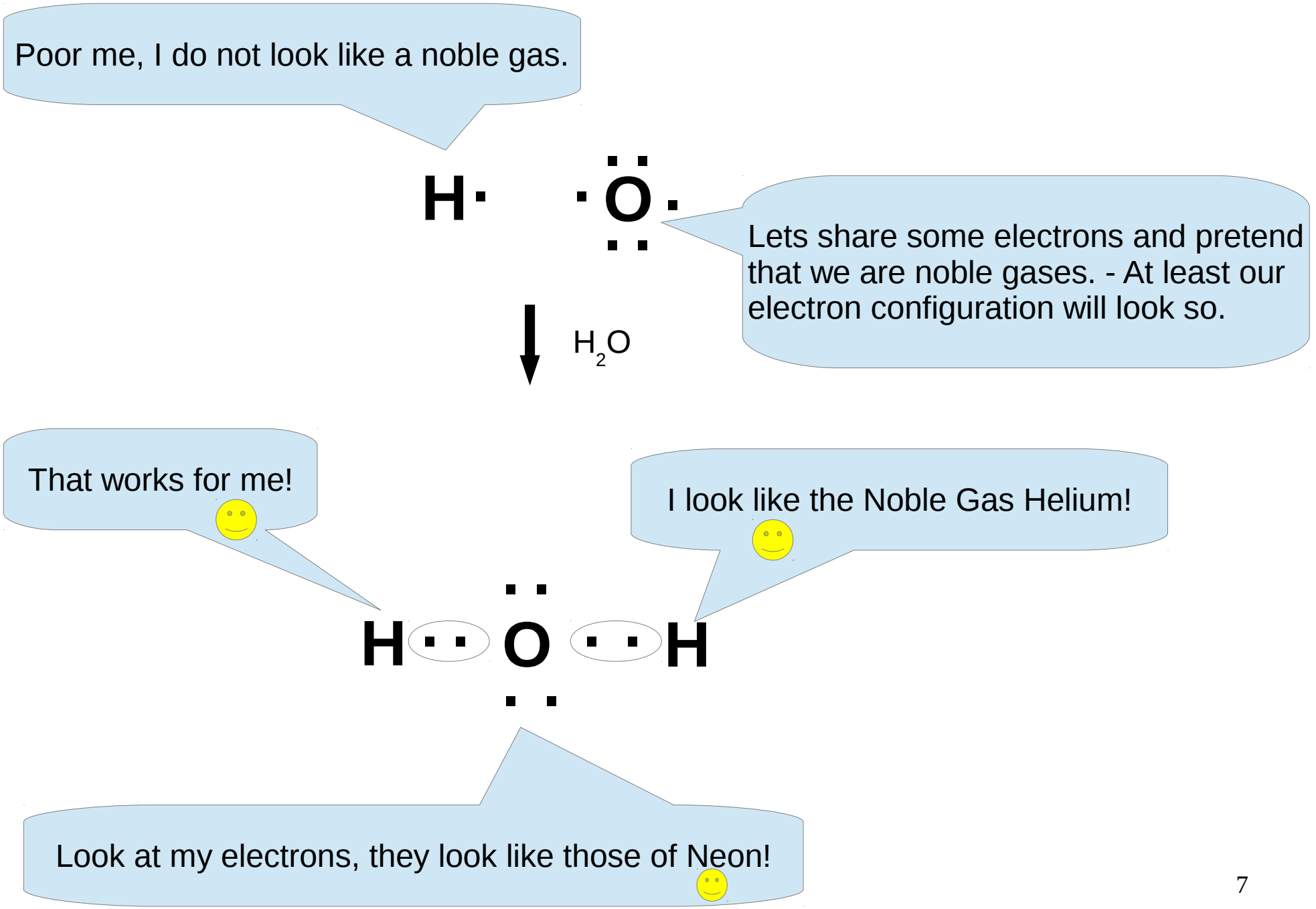
Poor me, I do not look like a noble gas.



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

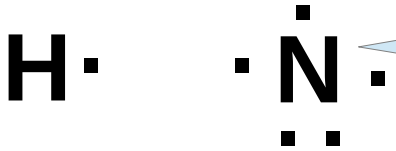
H_2O

Review : Covalent compound



Review : Covalent compound

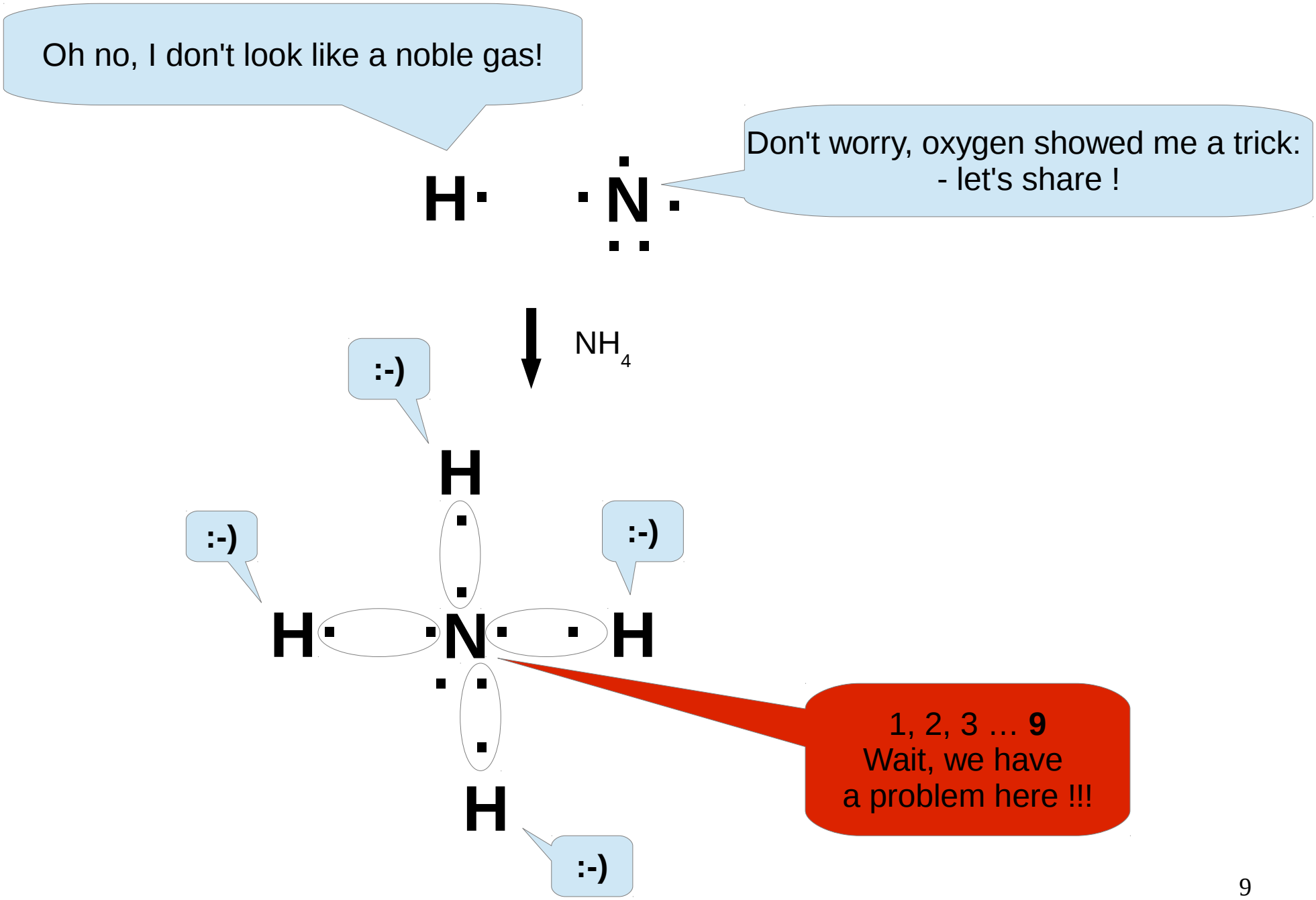
Oh no, I don't look like a noble gas!



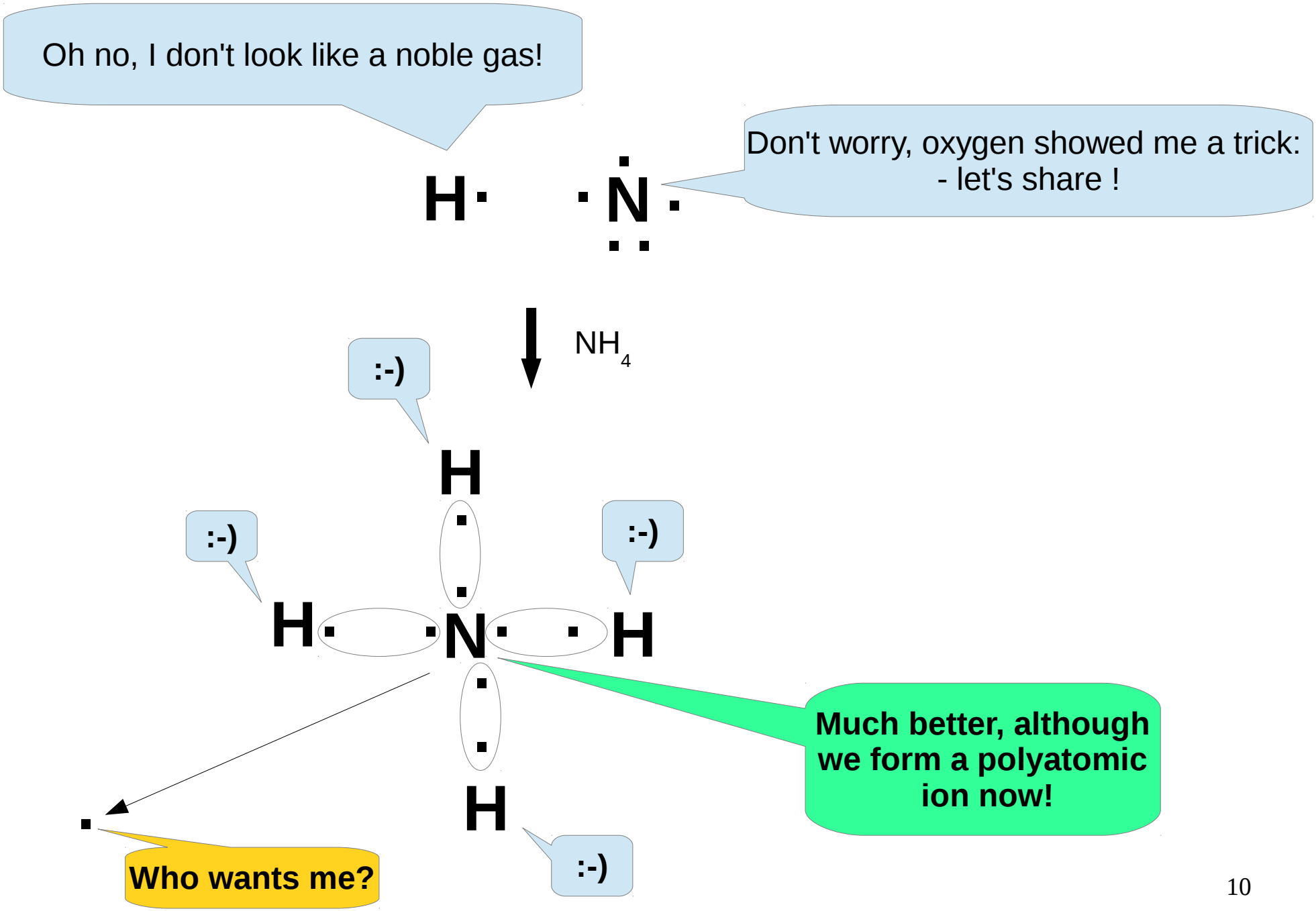
Don't worry, oxygen showed me a trick:
- let's share !

NH_4

Review : Covalent compound



Review : Covalent compound



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:

$NaNO_3$

iron(III) bicarbonate

ammonium sulfate

K_2SO_3

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:

$HCl_{(aq)}$

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

sulfuric acid

HNO_2

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

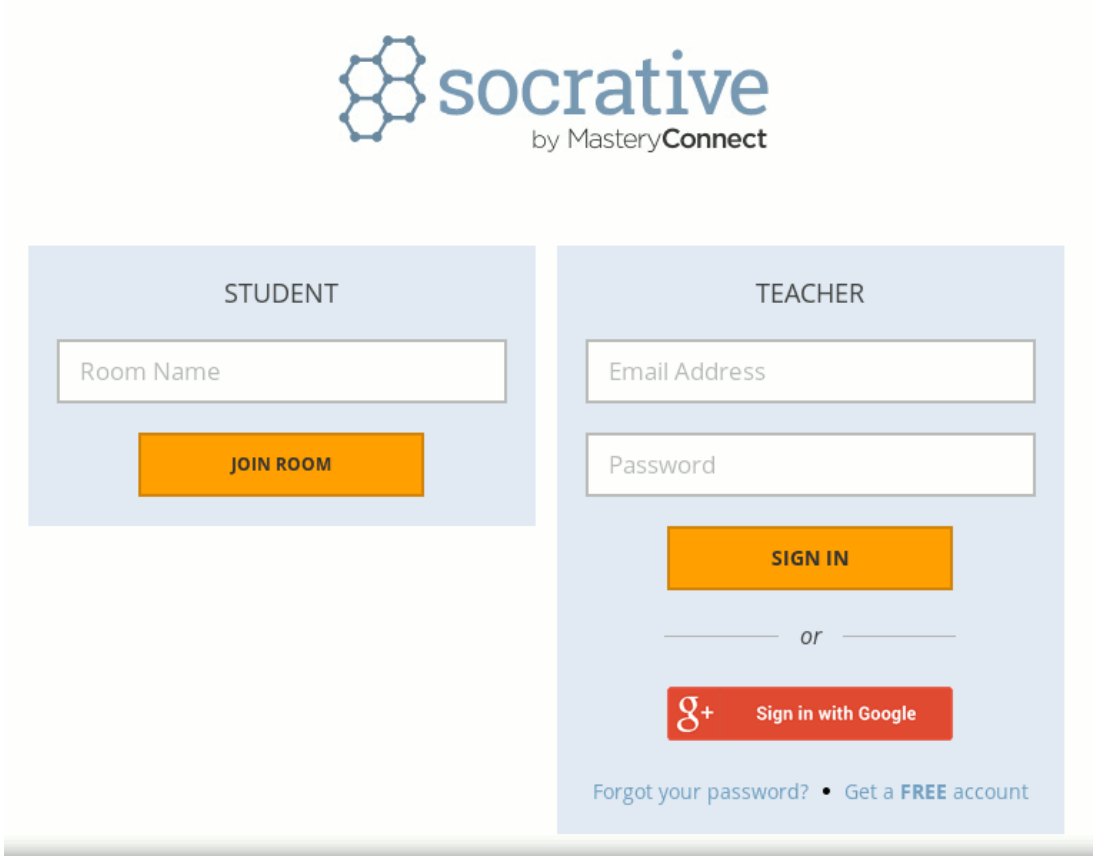
Don't forget that there is hydrogen in the formula!

→ Do Unit V – Problem 2-4

Review

Clicker Review Activity : Sec 4 – Nomenclature

http://b.socrative.com



Additional Resources

- Chemical Nomenclature, OpenStax „College Chemistry“
http://cnx.org/contents/havxkyvS@9.124:ZNqrI3l1@5/Chemical-Nomenclature

- Naming Covalent Compounds, Brightstorm on Youtube
https://youtu.be/VokWJy_jpAc

- Naming Ionic Compounds, Brightstorm on Youtube
https://youtu.be/7Lfc6jjp1WQ

- Polyatomic Ions, Tyler deWitt on Youtube
https://youtu.be/MJZeZvDxcx8