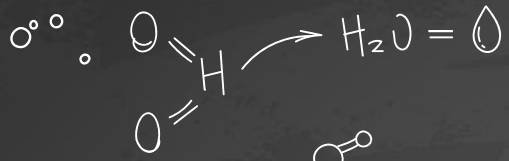
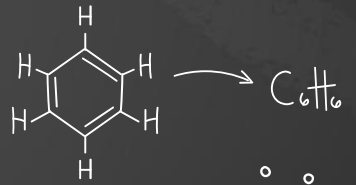
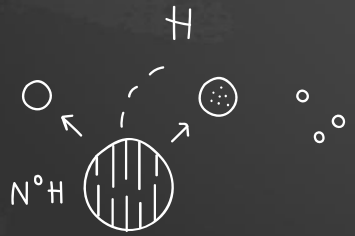
Chemistry - 1

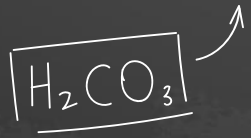
Hydrogen

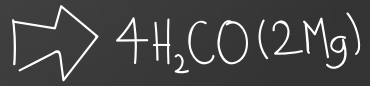
03/19/22



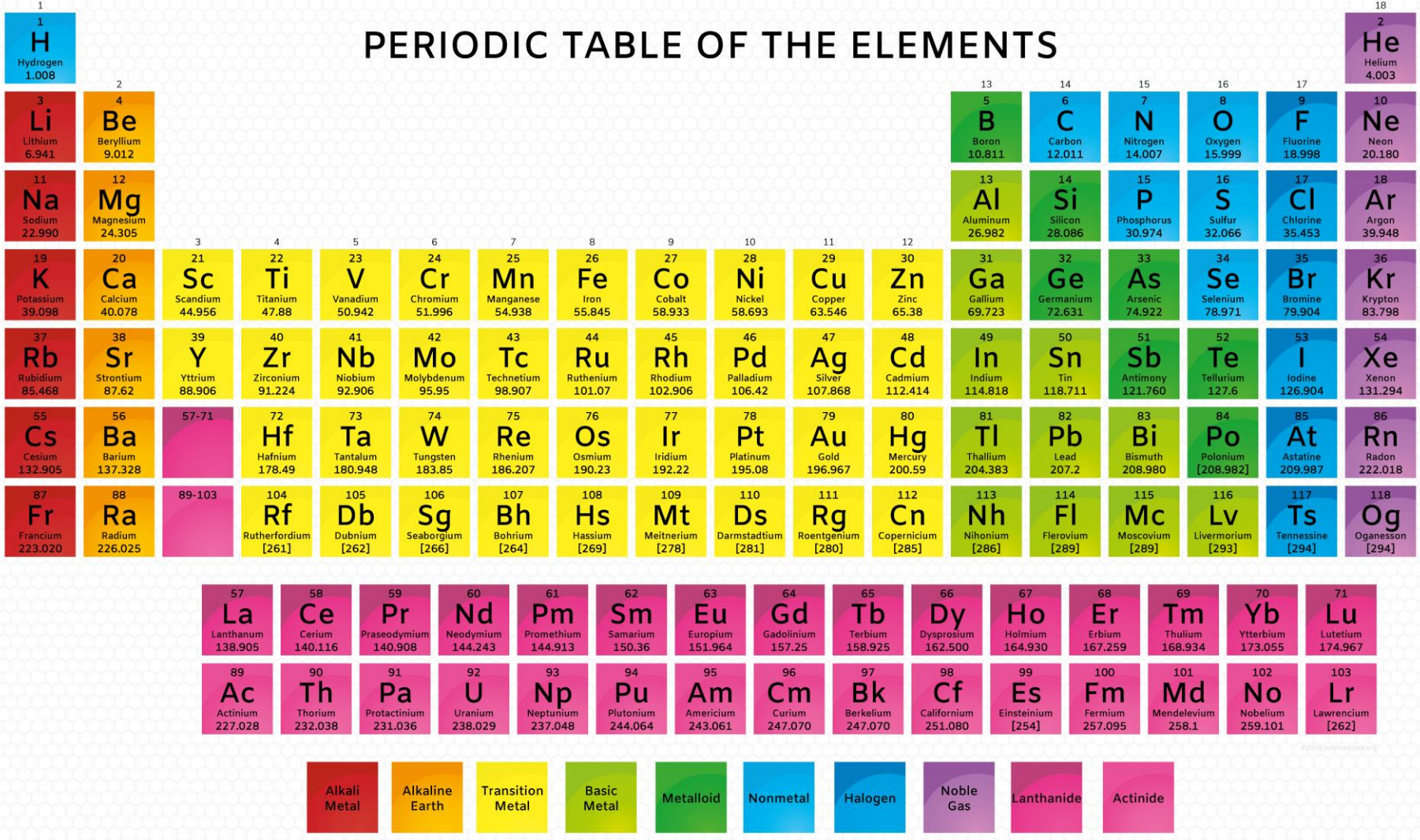




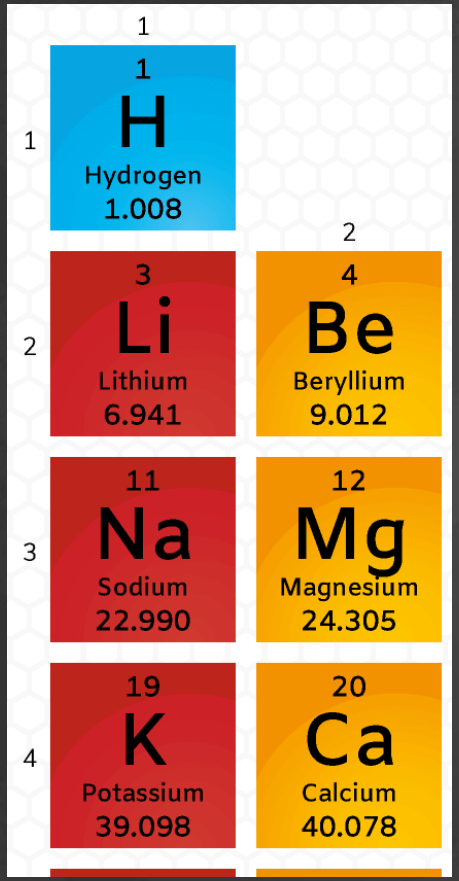




PERIODIC TABLE OF THE ELEMENTS



Hydrogen



The charge of the nucleus – (+1)

The number of electrons – 1

Atomic mass – 1

Valence – I

Most common oxidation state – (+1)

Hydrogen molecule – H_2

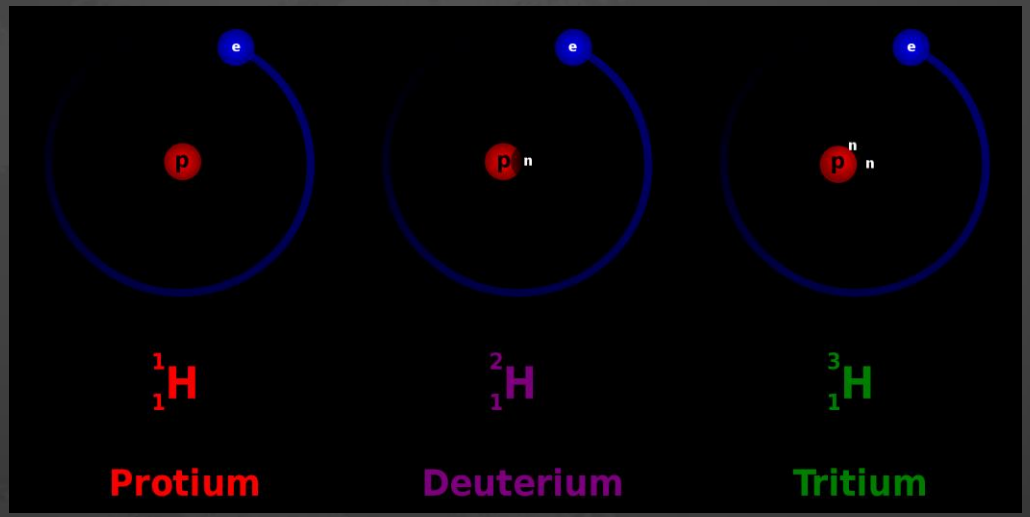
Molecular mass – 2 amu

Molar mass – 2 g/mole

$1s^1$

Hydrogen forms strong covalent molecules H_2.

It has 3 isotopes with different names:



The first electron shell can hold only 2 electrons. Hydrogen can lose its electron or acquire an electron for a stable configuration

$H - 1e = H^+$ (positive ions of hydrogen no electrons)

$H + 1e = H^-$ (negative ion of hydrogen $1s^2$)

Obtaining H_2

HF, HCl, H_2O

$$Zn + 2HCl = H_2 + ZnCl_2$$

$$Na + H_2O = H_2 + 2NaOH$$

$$3Fe + 4H_2O = H_2 + Fe_3O_4 \text{ (or } Fe_2O_3 \cdot FeO) \text{ (upon heating)}$$

$$C + H_2O \rightarrow CO + H_2 \ (1000^\circ C)$$

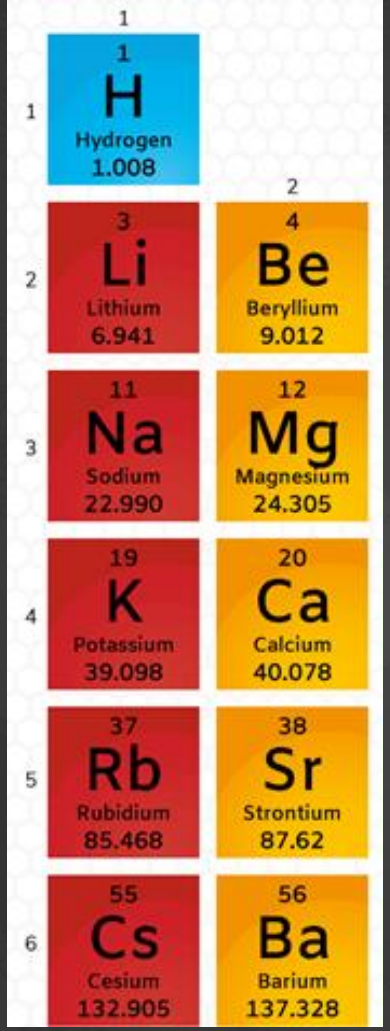
$$CH_4 + H_2O \rightarrow CO + 3H_2$$

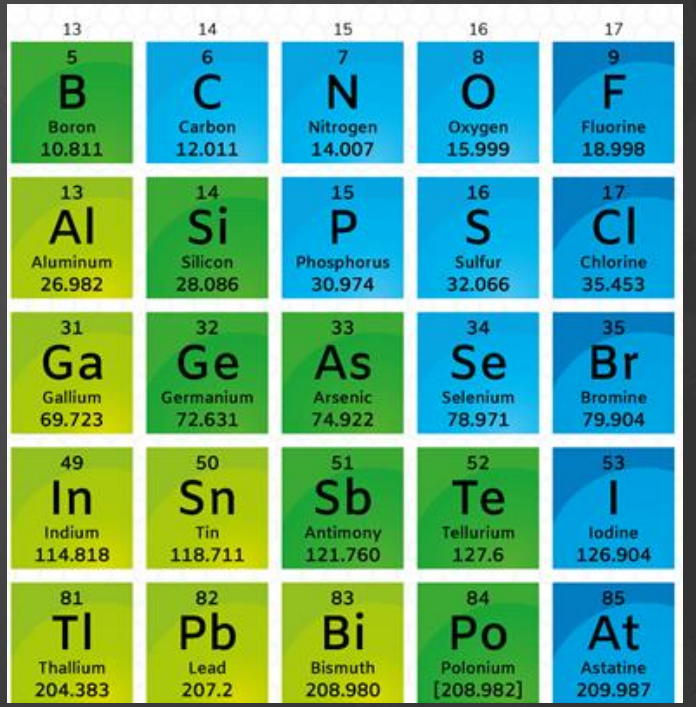
$$CO + H_2O \rightarrow CO_2 + H_2$$

$$CH_4 + 2H_2O \rightarrow 4H_2 + CO_2 \ (1100^\circ C)$$

$$2H_2O \rightarrow O_2 + 2H_2$$ water electrolysis

Hydrogen Compounds





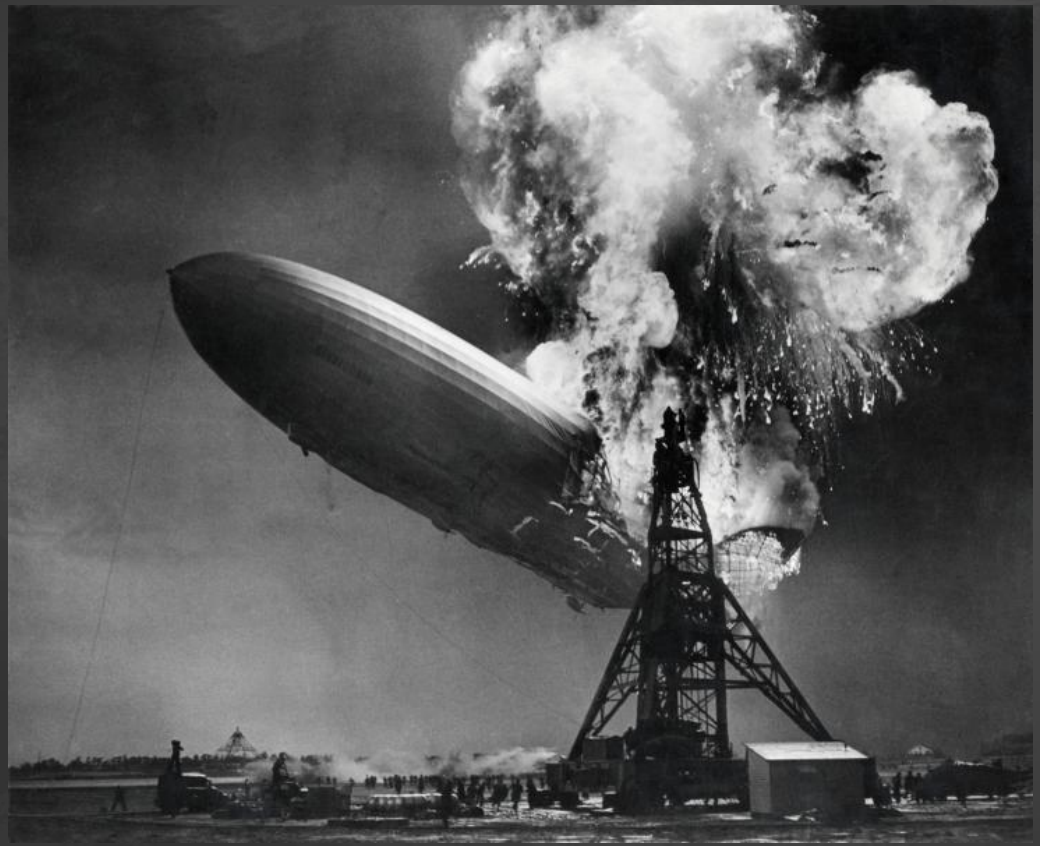
Hydrogen reactions

$$CaH_2 + 2\,H_2O \rightarrow Ca(OH)_2 + 2H_2$$

$$3H_2 + N_2 \rightarrow 2NH_3$$

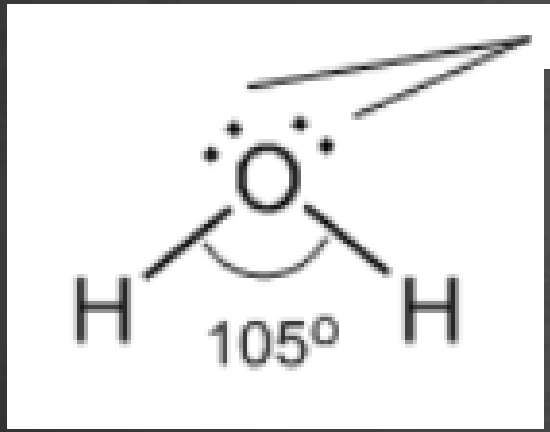
$$CuO + H_2 \rightarrow Cu + H_2O$$

Hydrogen reaction with oxygen



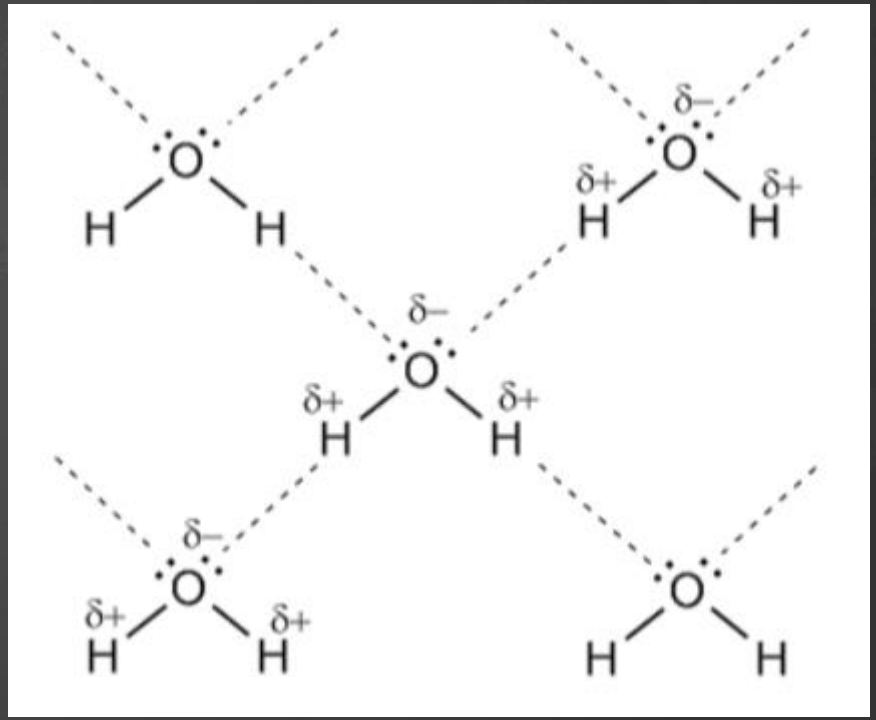
Airship Hindenburg, 1937

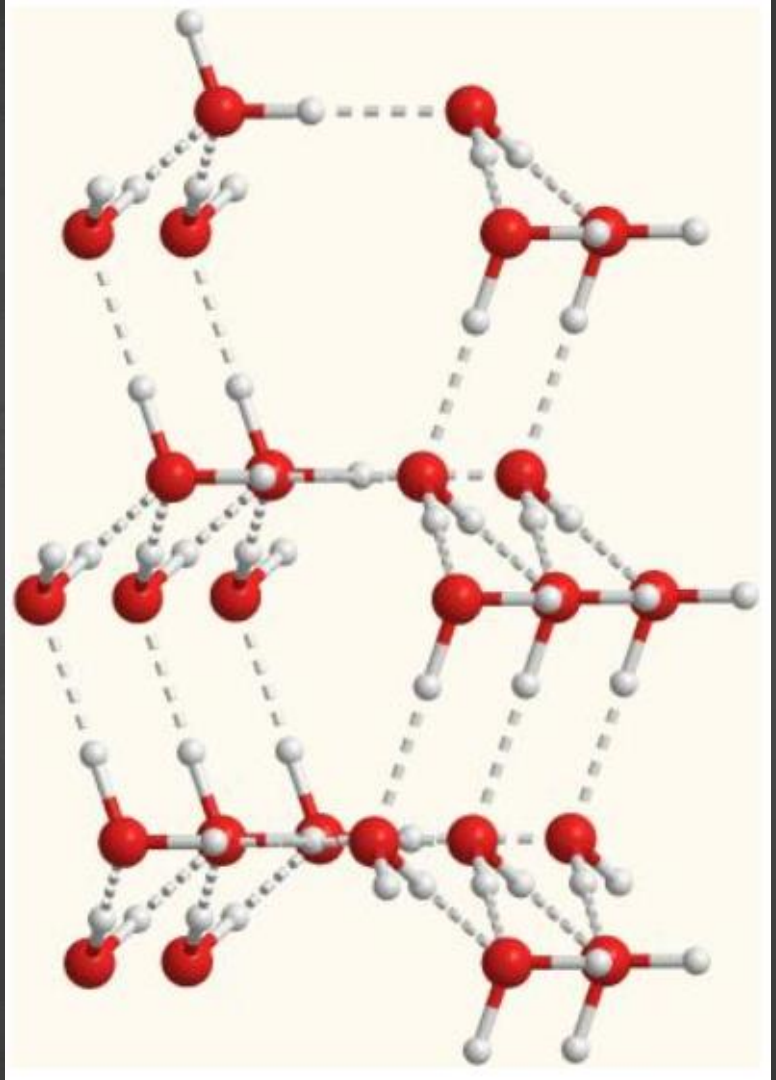
water, hydrogen bond



Unpaired electrons

Tetrahedron





This class uses the materials from the following books:
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Manyuilov and Rodionov “Chemistry for children and adults”
Kuzmenko, Eremin, Popkov “Beginnings of chemistry”
http://school-collection.edu.ru (experiments)