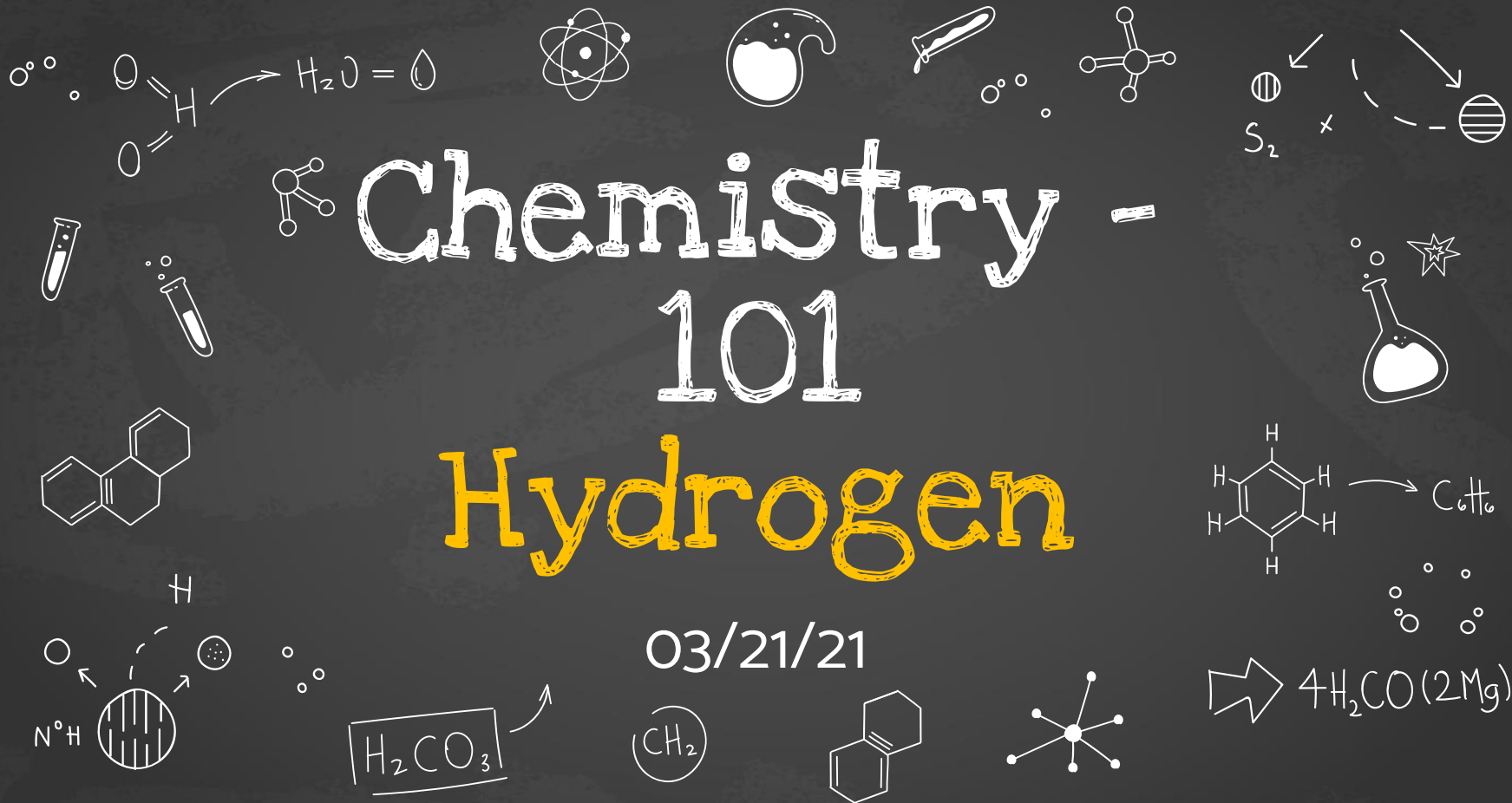


# Chemistry - 101

## Hydrogen

03/21/21



# PERIODIC TABLE OF THE ELEMENTS

PERIODIC TABLE OF THE ELEMENTS																	
1 H Hydrogen 1.008																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.631	33 As Arsenic 74.922	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 83.798
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.294
55 Cs Cesium 132.905	56 Ba Barium 137.328	57-71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987	86 Rn Radon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [278]	110 Ds Darmstadtium [281]	111 Rg Roentgenium [280]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 Lv Livermorium [293]	117 Ts Tennessine [294]	118 Og Oganesson [294]

57 <b>La</b> Lanthanum 138.905	58 <b>Ce</b> Cerium 140.116	59 <b>Pr</b> Praseodymium 140.908	60 <b>Nd</b> Neodymium 144.243	61 <b>Pm</b> Promethium 144.913	62 <b>Sm</b> Samarium 150.36	63 <b>Eu</b> Europium 151.964	64 <b>Gd</b> Gadolinium 157.25	65 <b>Tb</b> Terbium 158.925	66 <b>Dy</b> Dysprosium 162.500	67 <b>Ho</b> Holmium 164.930	68 <b>Er</b> Erbium 167.259	69 <b>Tm</b> Thulium 168.934	70 <b>Yb</b> Ytterbium 173.055	71 <b>Lu</b> Lutetium 174.967
89 <b>Ac</b> Actinium 227.028	90 <b>Th</b> Thorium 232.038	91 <b>Pa</b> Protactinium 231.036	92 <b>U</b> Uranium 238.029	93 <b>Np</b> Neptunium 237.048	94 <b>Pu</b> Plutonium 244.064	95 <b>Am</b> Americium 243.061	96 <b>Cm</b> Curium 247.070	97 <b>Bk</b> Berkelium 247.070	98 <b>Cf</b> Californium 251.080	99 <b>Es</b> Einsteinium [254]	100 <b>Fm</b> Fermium 257.095	101 <b>Md</b> Mendelevium 258.1	102 <b>No</b> Nobelium 259.101	103 <b>Lr</b> Lawrencium [262]

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Alkali Metal	Alkaline Earth	Transition Metal	Basic Metal	Metalloid	Nonmetal	Halogen	Noble Gas	Lanthanide	Actinide
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# Hydrogen

1	1 <b>H</b> Hydrogen 1.008	
2	3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.012
3	11 <b>Na</b> Sodium 22.990	12 <b>Mg</b> Magnesium 24.305
4	19 <b>K</b> Potassium 39.098	20 <b>Ca</b> Calcium 40.078

The charge of the nucleus -

The number of electrons -

Atomic mass -

Valence -

Most common oxidation state -

Hydrogen molecule -

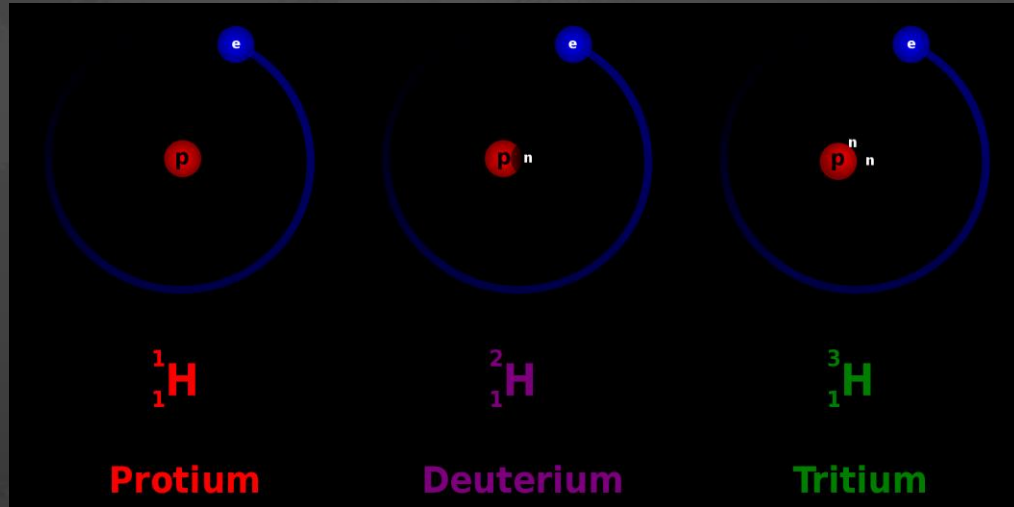
Molecular mass -

Molar mass -

$1s^1$

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

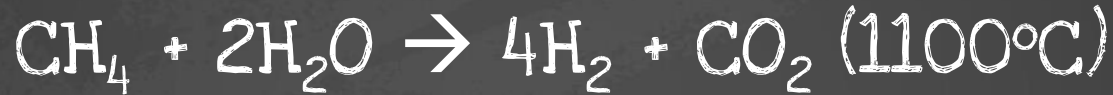
$H - 1e = H^+$  (positive ion of hydrogen no electrons)

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

## Obtaining $H_2$

HF, HCl,  $H_2O$







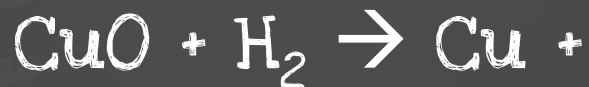
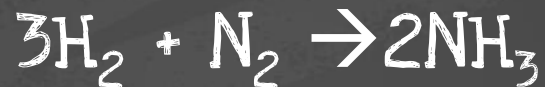
# Hydrogen compounds

1	1 <b>H</b> Hydrogen 1.008	
2	3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.012
3	11 <b>Na</b> Sodium 22.990	12 <b>Mg</b> Magnesium 24.305
4	19 <b>K</b> Potassium 39.098	20 <b>Ca</b> Calcium 40.078
5	37 <b>Rb</b> Rubidium 85.468	38 <b>Sr</b> Strontium 87.62
6	55 <b>Cs</b> Cesium 132.905	56 <b>Ba</b> Barium 137.328

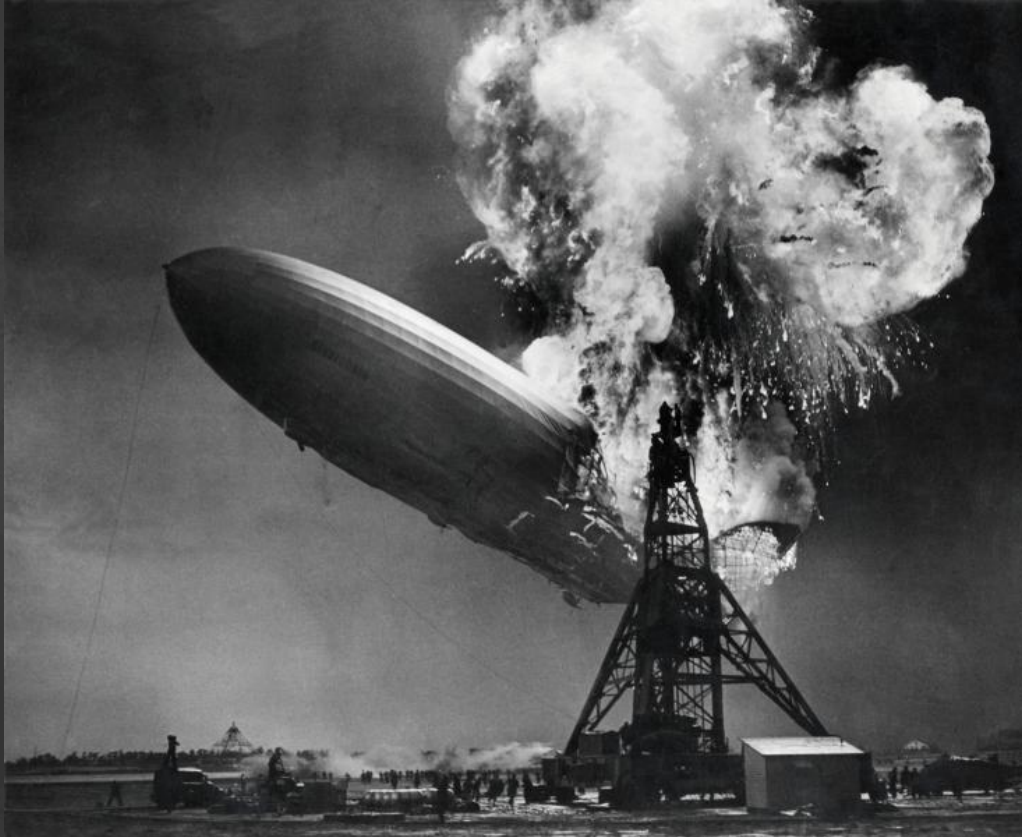
13 5 <b>B</b> Boron 10.811	14 6 <b>C</b> Carbon 12.011	15 7 <b>N</b> Nitrogen 14.007	16 8 <b>O</b> Oxygen 15.999	17 9 <b>F</b> Fluorine 18.998
13 13 <b>Al</b> Aluminum 26.982	14 14 <b>Si</b> Silicon 28.086	15 15 <b>P</b> Phosphorus 30.974	16 16 <b>S</b> Sulfur 32.066	17 17 <b>Cl</b> Chlorine 35.453
31 31 <b>Ga</b> Gallium 69.723	32 32 <b>Ge</b> Germanium 72.631	33 33 <b>As</b> Arsenic 74.922	34 34 <b>Se</b> Selenium 78.971	35 35 <b>Br</b> Bromine 79.904
49 49 <b>In</b> Indium 114.818	50 50 <b>Sn</b> Tin 118.711	51 51 <b>Sb</b> Antimony 121.760	52 52 <b>Te</b> Tellurium 127.6	53 53 <b>I</b> Iodine 126.904
81 81 <b>Tl</b> Thallium 204.383	82 82 <b>Pb</b> Lead 207.2	83 83 <b>Bi</b> Bismuth 208.980	84 84 <b>Po</b> Polonium [208.982]	85 85 <b>At</b> Astatine 209.987



# Hydrogen reactions

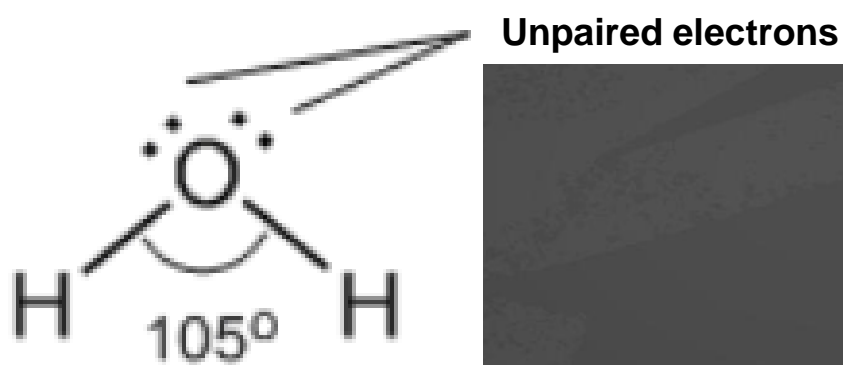


# Hydrogen reaction with oxygen

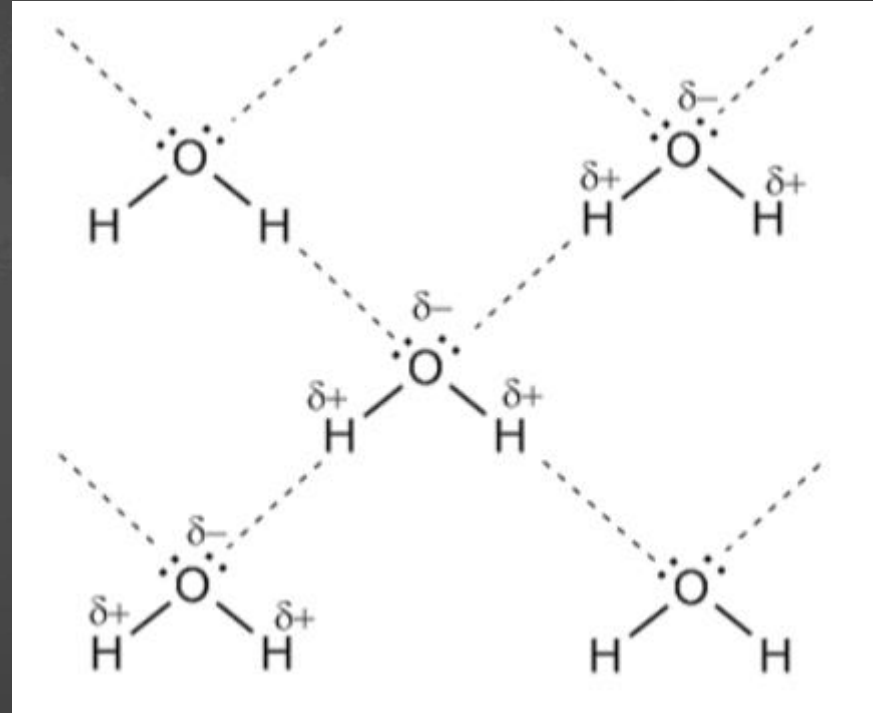


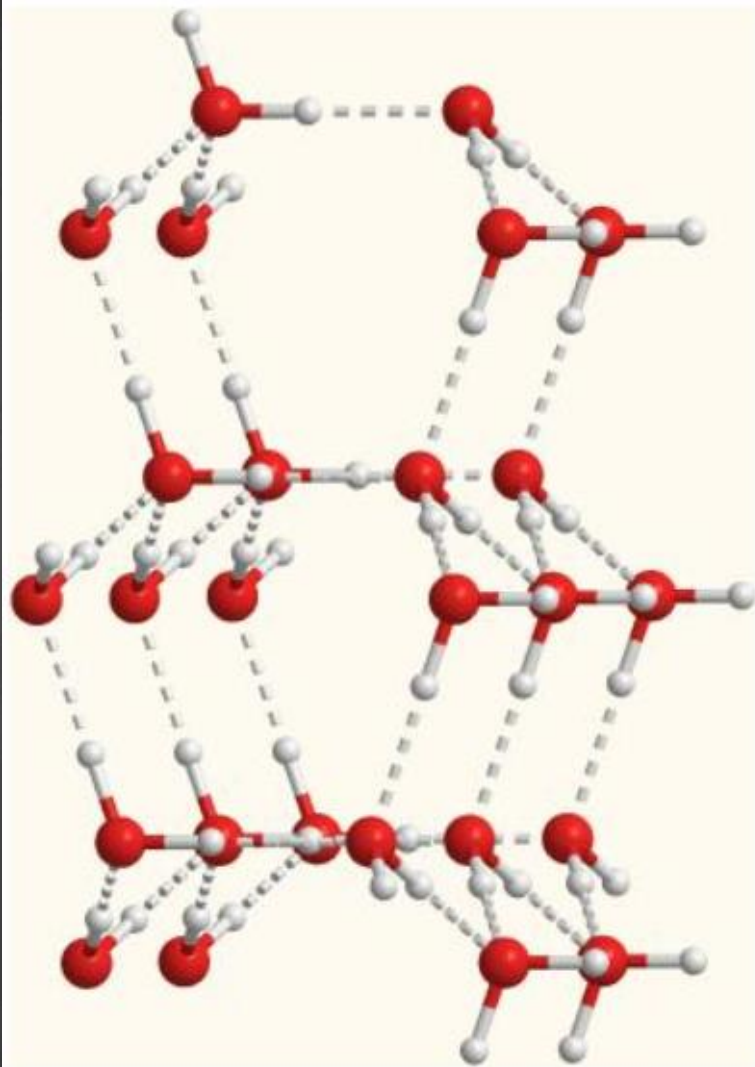
Airship Hindenburg, 1937

# water, hydrogen bond



Tetrahedron





This class uses the materials from the following books:

”

Manyuilov and Rodionov “Chemistry for children and adults”

Kuzmenko, Eremin, Popkov “Beginnings of chemistry”

<http://school-collection.edu.ru> (experiments)