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*Header with fields for page number and total pages.*

## Chemistry and Access

Chemistry is the branch of science that studies matter and its behavior of matter and properties. Access is the best desktop database management system. It is a superior tool to organize data and create user interface objects like queries, forms and reports. Access can also link to data in other formats on the desktop and in the cloud. Access is access!

## Elements

Man has identified (or synthesized) 118 distinct types of substances that all matter is composed of. These building blocks, called 'Elements', are pure substances that can't be broken down into simpler chemical substances.

## Periodic Table

The Periodic Table is a list of all the chemical elements arranged in an order to help identify their behavior and characteristics. It is arranged by atomic number into rows called "periods" and columns called "groups". The periodic table was created by Dmitri Mendeleev, a Russian chemist, in 1869. He conceived the periodic law to predict chemical properties based on atomic number.

Here is the periodic table as it is today.

Periodic Table of the Elements																					
1A																	8A				
1																	2				
<b>H</b> Hydrogen 1																	<b>He</b> Helium 4				
3	2A															13	14	15	16	17	18
<b>Li</b> Lithium 7	<b>Be</b> Beryllium 9															<b>B</b> Boron 10	<b>C</b> Carbon 12	<b>N</b> Nitrogen 14	<b>O</b> Oxygen 16	<b>F</b> Fluorine 19	<b>Ne</b> Neon 20
11	12															31	32	33	34	35	36
<b>Na</b> Sodium 23	<b>Mg</b> Magnesium 24															<b>Al</b> Aluminum 27	<b>Si</b> Silicon 28	<b>P</b> Phosphorus 31	<b>S</b> Sulfur 32	<b>Cl</b> Chlorine 35	<b>Ar</b> Argon 40
19	20	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	30	31	32	33	34	35	36			
<b>K</b> Potassium 39	<b>Ca</b> Calcium 40	<b>Sc</b> Scandium 45	<b>Ti</b> Titanium 48	<b>V</b> Vanadium 51	<b>Cr</b> Chromium 52	<b>Mn</b> Manganese 55	<b>Fe</b> Iron 56	<b>Co</b> Cobalt 59	<b>Ni</b> Nickel 59	<b>Cu</b> Copper 64	<b>Zn</b> Zinc 65	<b>Ga</b> Gallium 70	<b>Ge</b> Germanium 73	<b>As</b> Arsenic 75	<b>Se</b> Selenium 79	<b>Br</b> Bromine 80	<b>Kr</b> Krypton 84				
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54				
<b>Rb</b> Rubidium 85	<b>Sr</b> Strontium 88	<b>Y</b> Yttrium 89	<b>Zr</b> Zirconium 91	<b>Nb</b> Niobium 93	<b>Mo</b> Molybdenum 96	<b>Tc</b> Technetium 98	<b>Ru</b> Ruthenium 101	<b>Rh</b> Rhodium 103	<b>Pd</b> Palladium 106	<b>Ag</b> Silver 108	<b>Cd</b> Cadmium 112	<b>In</b> Indium 115	<b>Sn</b> Tin 119	<b>Sb</b> Antimony 122	<b>Te</b> Tellurium 128	<b>I</b> Iodine 127	<b>Xe</b> Xenon 131				
55	56	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86				
<b>Cs</b> Cesium 133	<b>Ba</b> Barium 137	<b>Lu</b> Lutetium 175	<b>Hf</b> Hafnium 178	<b>Ta</b> Tantalum 181	<b>W</b> Tungsten 184	<b>Re</b> Rhenium 186	<b>Os</b> Osmium 190	<b>Ir</b> Iridium 192	<b>Pt</b> Platinum 195	<b>Au</b> Gold 197	<b>Hg</b> Mercury 201	<b>Tl</b> Thallium 204	<b>Pb</b> Lead 207	<b>Bi</b> Bismuth 209	<b>Po</b> Polonium 209	<b>At</b> Astatine 210	<b>Rn</b> Radon 222				
87	88	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118				
<b>Fr</b> Francium 223	<b>Ra</b> Radium 226	<b>Lr</b> Lawrencium 262	<b>Rf</b> Rutherfordium 261	<b>Db</b> Dubnium 262	<b>Sg</b> Seaborgium 266	<b>Bh</b> Bohrium 264	<b>Hs</b> Hassium 277	<b>Mt</b> Meitnerium 268	<b>Ds</b> Darmstadtium 270	<b>Rg</b> Roentgenium 272	<b>Cn</b> Copernicium 284	<b>Nh</b> Nihonium 287	<b>Fl</b> Flerovium 289	<b>Mc</b> Moscovium 290	<b>Lv</b> Livermorium 293	<b>Ts</b> Tennessine 294	<b>Og</b> Oganesson 294				
		57	58	59	60	61	62	63	64	65	66	67	68	69	70						
		<b>La</b> Lanthanum 139	<b>Ce</b> Cerium 140	<b>Pr</b> Praseodymium 141	<b>Nd</b> Neodymium 144	<b>Pm</b> Promethium 145	<b>Sm</b> Samarium 150	<b>Eu</b> Europium 152	<b>Gd</b> Gadolinium 157	<b>Tb</b> Terbium 159	<b>Dy</b> Dysprosium 162	<b>Ho</b> Holmium 165	<b>Er</b> Erbium 167	<b>Tm</b> Thulium 169	<b>Yb</b> Ytterbium 173						
		89	90	91	92	93	94	95	96	97	98	99	100	101	102						
		<b>Ac</b> Actinium 227	<b>Th</b> Thorium 232	<b>Pa</b> Protactinium 231	<b>U</b> Uranium 238	<b>Np</b> Neptunium 237	<b>Pu</b> Plutonium 244	<b>Am</b> Americium 243	<b>Cm</b> Curium 247	<b>Bk</b> Berkelium 247	<b>Cf</b> Californium 251	<b>Es</b> Einsteinium 252	<b>Fm</b> Fermium 257	<b>Md</b> Mendelevium 258	<b>No</b> Nobelium 259						

Figure 1. Periodic Table of the Elements

For more information about the periodic table, see this article on Wikipedia:

[https://en.wikipedia.org/wiki/Periodic\\_table](https://en.wikipedia.org/wiki/Periodic_table)

### Periodic Table of Nutritional Elements

Many elements in the periodic table are essential to life. This diagram shows 33 elements necessary for humans, and some that are required for lower organisms.

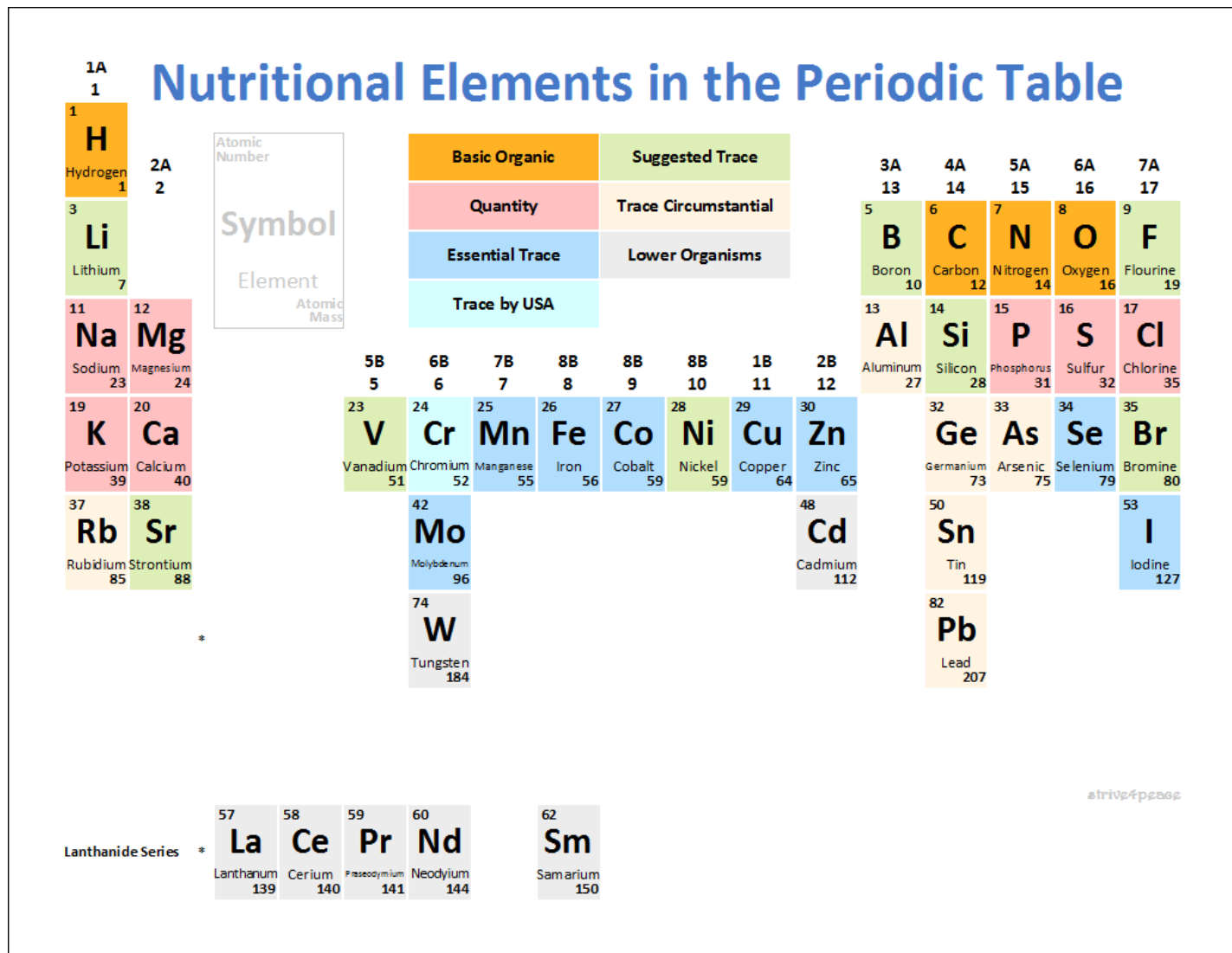


Figure 2. Nutritional Elements in the Periodic Table

### Atom

An atom is the smallest unit of matter. It comes from the Greek word, atomos, meaning "unable to be cut".

In the middle of an atom is a nucleus consisting of positively charged particles called protons, and particles with no charge called neutrons.

Negatively charged particles called electrons orbit around the nucleus. An electron is only about 1/1836th the size of a proton!

An atom is identified by its number of protons, which is called the atomic number. In its original form, an atom has the same number of electrons and neutrons as protons.

Electrons may be added, removed, or shared during chemical reactions, causing an atom to get an overall charge and help it bond to other atoms to form molecules.

A molecule has multiple atoms that are chemically bonded. If all the atoms in a molecule have the same atomic number, that molecule is also called an element.

Atoms with the same atomic number and a different number of neutrons are called isotopes.

Atoms with the same atomic number and a different number of electrons are called ions. A cation is positive. An anion is negative. Ions can also be a molecule with a net electrical charge.

## Hydrogen

Hydrogen is the lightest element with an atomic number of 1. It is the most abundant element in the universe and comprises about 75% of all matter. Having just one electron in its valence shell, it is highly reactive.



Figure 3. H, Hydrogen atom,  $Z=1$ , Group=1, 1A, Period=1, Nonmetal, Basic Organic Nutrient

## Oxygen

Oxygen is essential to human life. It is the 3rd most abundant element on Earth and is classified as a nonmetal. It's also highly reactive. A water molecule is one oxygen atom and 2 hydrogen atoms, which means it is mostly oxygen since an oxygen atom is much bigger than a hydrogen atom.

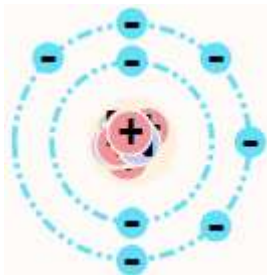


Figure 4. O, Oxygen atom,  $Z=8$ , Group=16, 6A, Period=2, Nonmetal, Basic Organic Nutrient

## Carbon

By mass, Carbon is the 2nd most abundant element in the human body, and 4th most abundant element in the universe. One of its isotopes, C14, is a Radionuclide and decays with a half-life of about 5,730 years, so it can be used for dating how old something is. It comes from the Latin word carbo, for coal.

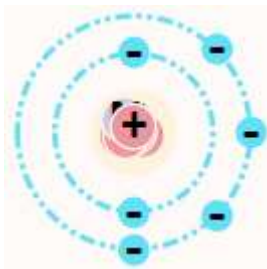


Figure 5. C, Carbon atom,  $Z=6$ , Group=14, 4A, Period=2, Nonmetal, Basic Organic Nutrient

## Nitrogen

Nitrogen is the 7th most common element in the Milky Way, and most abundant in our atmosphere as an uncombined element. In the human body, it is about 3% by mass, and 4th most abundant

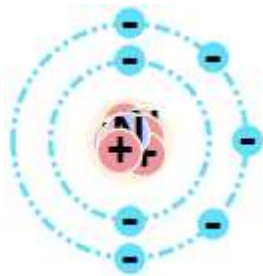


Figure 6. N, Nitrogen atom,  $Z=7$ , Group=15, 5A, Period=2, Nonmetal, Basic Organic Nutrient

## Oganesson

Oganesson is the heaviest and biggest element. It is radioactive and doesn't occur naturally. It was synthesized in a laboratory.

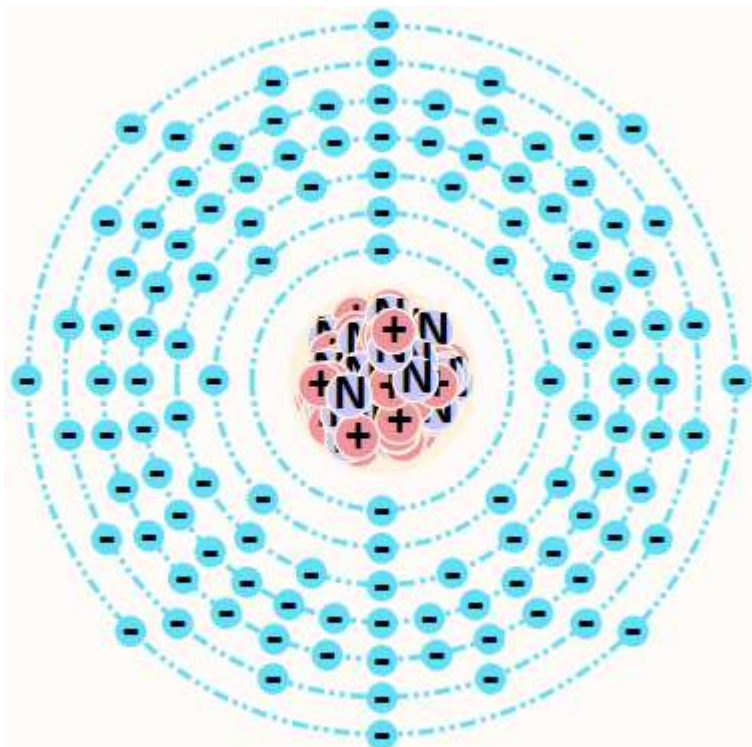


Figure 7. Og, Oganesson atom,  $Z=118$ , Group=18, 8A, Period=7, Unknown, Radioactive

There are 7 images in this document.