

# What Is the Atomic Theory?

Chapter 10 Lesson 3

ByDesign Science, Level 4

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# Atoms

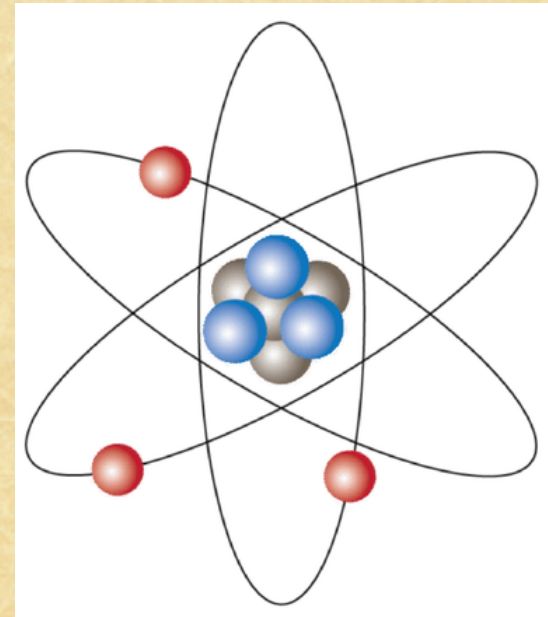


- ♦ Atomic theory is the idea that matter is made up of smaller particles called *atoms*.
- ♦ The Greek philosopher Democritus first stated this idea in the 5<sup>th</sup> century B.C.
- ♦ An English chemist named John Dalton revived the idea of atoms in 1801.



# Atoms

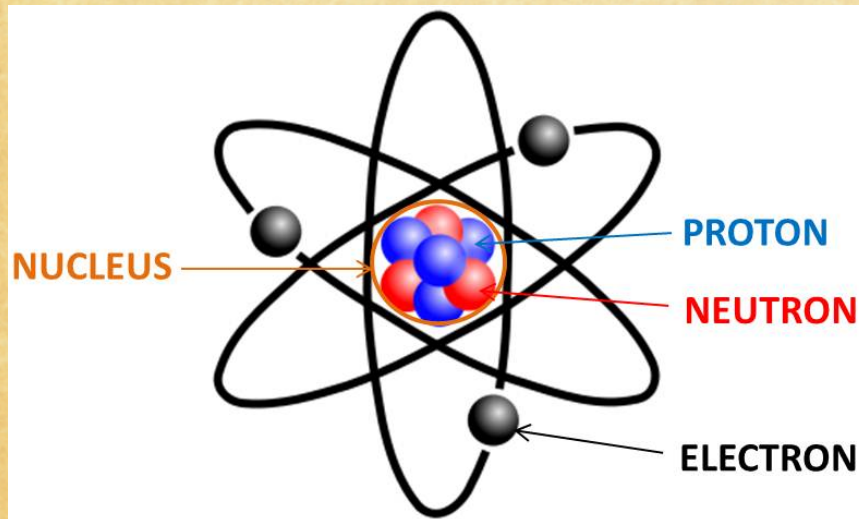
- ♦ The first part of Dalton's theory states that atoms are the basic building blocks of which all matter is made.
- ♦ But what is an atom made of?
- ♦ Atoms are made up of three types of particles. These particles are protons, neutrons, and electrons.





# Atoms

- ♦ Protons and neutrons make up the center part of an atoms, called the nucleus.
- ♦ Electrons move around the nucleus in a region called an electron cloud.










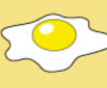






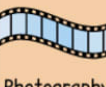



- ♦ The number of protons and the number of electrons are equal in an atom.



# Atoms

- ♦ An element is matter that is made of only one kind of atom.
- ♦ The second part of the atomic theory says that all atoms of a given element have the same basic properties.
- ♦ About 100 elements are found in nature.

B Boron  Sports Equipment	5 C Carbon  Basis of Life's Molecules	6 N Nitrogen  Protein	7 O Oxygen  Air	8 F Fluorine  Toothpaste	9 Ne Neon  Advertising Signs
Al Aluminum  Airplanes	13 Si Silicon  Stone, Sand, and Soil	14 P Phosphorus  Bones	15 S Sulfur  Eggs	16 Cl Chlorine  Swimming Pools	17 Ar Argon  Light Bulbs
31 Ga Gallium  Light-Emitting Diodes (LEDs)	32 Ge Germanium  Semiconductor Electronics	33 As Arsenic  Poison	34 Se Selenium  Copiers	35 Br Bromine  Photography Film	36 Kr Krypton  Flashlights



# Atoms

- ♦ Scientists have made very tiny amounts of other elements.
- ♦ Usually, these human-made elements are larger and less stable than those found in nature.

1																	18	
1	H 1																	2
2	Li 3	Be 4															10	
3	Na 11	Mg 12	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4	K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36
5	Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54
6	Cs 55	Ba 56	* 72	Hf 73	Ta 74	W 75	Re 76	Os 77	Ir 78	Pt 79	Au 80	Hg 81	Tl 82	Pb 83	Bi 84	Po 85	At 86	Rn 87
7	Fr 87	Ra 88	** 104	Rf 105	Db 106	Sg 107	Bh 108	Hs 109	Mt 110	Ds 111	Rg 112	Cn 113	Nh 114	Fl 115	Mc 116	Lv 117	Ts 118	Og 119
* lanthanoids																		
	La 57	Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70	Lu 71			
** actinoids																		
	Ac 89	Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102	Lr 103			

- ♦ Different elements have different numbers of particles in their atoms.



# Atoms

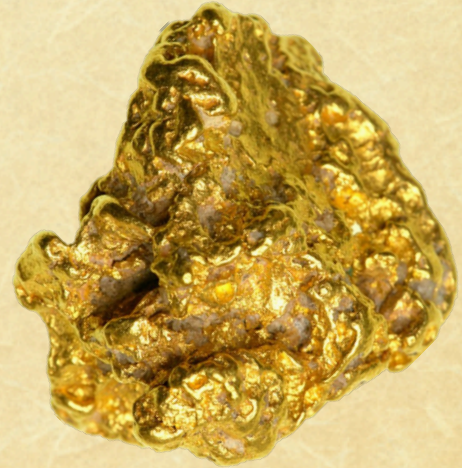
- ♦ The chart below shows some examples of elements.

Element	Number of Protons	Number of Neutrons	Number of Electrons
Oxygen	8	8	8
Sulfur	16	16	16
Copper	29	34	29
Gold	79	118	79



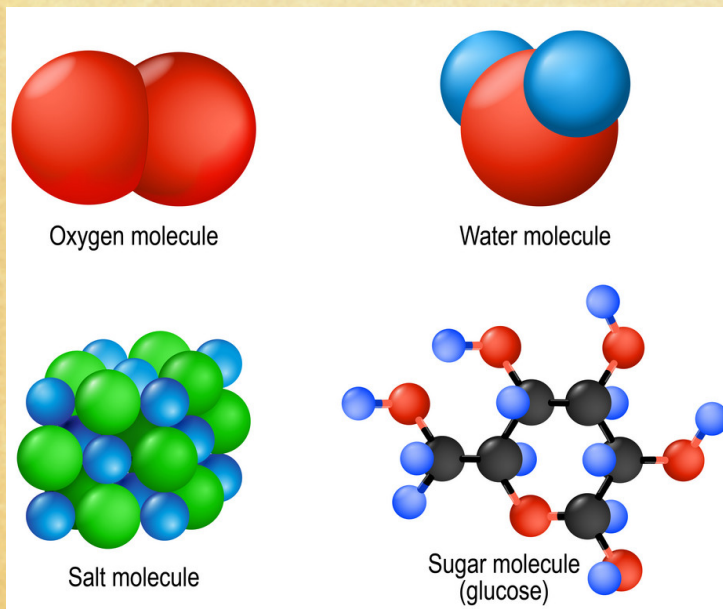
# Atoms

- ♦ Look at the gold in the photograph.
- ♦ Imagine that you could divide a gold flake over and over.
- ♦ At some point, you would need a microscope to see the tiny pieces.
- ♦ But each piece would still contain millions of atoms.





# Joining Atoms

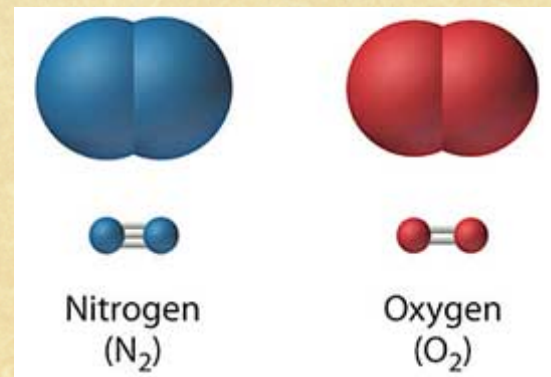


- ♦ Atoms can join with other atoms.
- ♦ When two or more atoms join, they form a molecule.
- ♦ Some molecules are made of two atoms of the same element.



# Joining Atoms

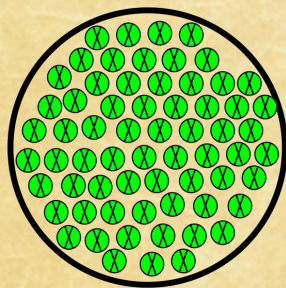
- ♦ Nitrogen and oxygen are elements in the air.
- ♦ Nitrogen exists as molecules that are made of two nitrogen atoms joined.
- ♦ Oxygen molecules are made of two oxygen atoms.
- ♦ Some molecules are much larger.
- ♦ Some molecules in your body are made of hundreds of atoms.



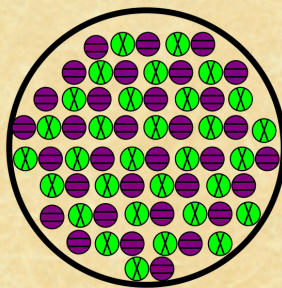


# Joining Atoms

- ♦ The third part of the atomic theory states that some molecules are made of atoms of different elements.
- ♦ Substances that are made of atoms of two or more elements chemically combined are called compounds.



Element

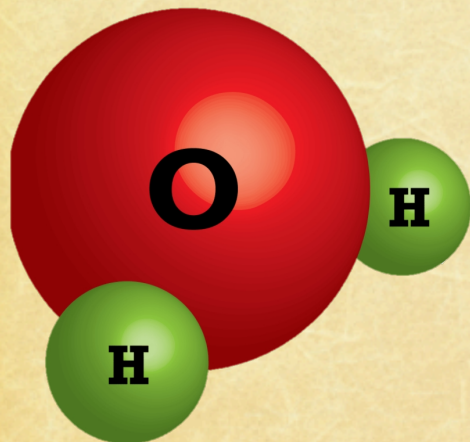


Compound

- ♦ A compound is not easily separated back into the elements that make it up.



# Joining Atoms



- ♦ Water is a compound of hydrogen and oxygen.
- ♦ A water molecule has two hydrogen atoms and one oxygen atom.



# Joining Atoms

- ♦ Carbon dioxide is a gas we breathe out.
- ♦ It is made of one atom of carbon and two atoms of oxygen.

