

THE PERIODIC TABLE

1 H 1.008																	18 Ar 39.948	19 K 39.098	20 Ca 40.078											28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798
3 Li 6.941	4 Be 9.012																	19 K 39.098	20 Ca 40.078											29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798	
5 Na 22.990	6 Mg 24.305																	21 Sc 44.956	22 Ti 47.88	23 V 50.942	24 Cr 52.00	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798					
7 Rb 85.468	8 Sr 87.62																	23 V 50.942	24 Cr 52.00	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798							
9 Y 88.906	10 Zr 91.224	11 Nb 92.906	12 Mo 95.94	13 Tc 98.906	14 Ru 101.07	15 Rh 102.91	16 Pd 106.42	17 Ag 107.87	18 Cd 112.41	19 In 114.82	20 Sn 118.71	21 Sb 121.76	22 Te 127.6	23 I 126.91	24 Xe 131.29																							
11 Cs 132.91	12 Ba 137.33	13 La 138.91	14 Ce 140.12	15 Pr 140.91	16 Nd 144.24	17 Pm 144.91	18 Sm 150.36	19 Eu 151.96	20 Gd 157.25	21 Tb 158.93	22 Dy 162.50	23 Ho 164.93	24 Er 167.26	25 Tm 168.93	26 Yb 173.05	27 Lu 174.97																						
13 Fr 223.02	14 Ra 226.02	15 Ac 227.03	16 Th 232.04	17 Pa 231.04	18 U 238.03	19 Np 237.05	20 Pu 244.06	21 Am 243.06	22 Cm 247.07	23 Bk 247.07	24 Cf 251.08	25 Es 252.08	26 Fm 257.10	27 Md 258.10	28 No 259.10	29 Lr 262.11																						

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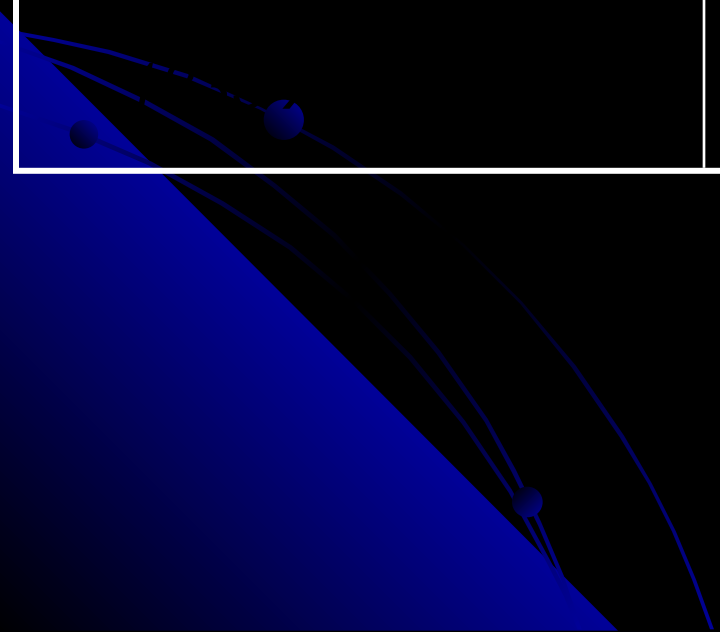
● Atoms, Elements, ● & ● The Periodic Table

- Matter – anything that has mass & volume
- Element – a substance composed of only 1 kind of atom
- Atom – smallest particle of an element

A decorative graphic in the bottom-left corner of the slide. It features a solid blue triangular area. Overlapping this and extending into the black background are several thin, curved blue lines that sweep upwards and to the right. Small blue dots are placed along these curves, resembling electrons in an atomic model.

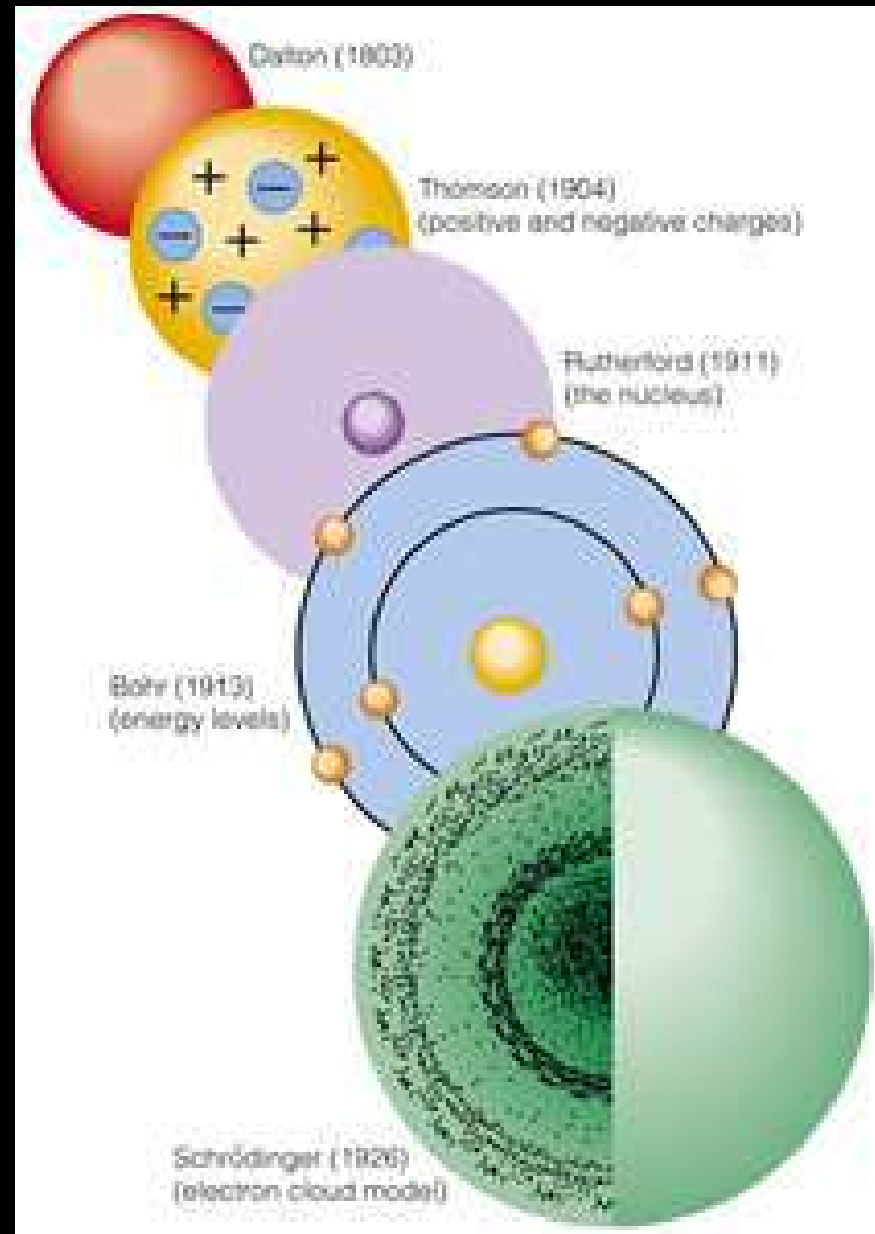
atomic structure video clip

Atomic structure:

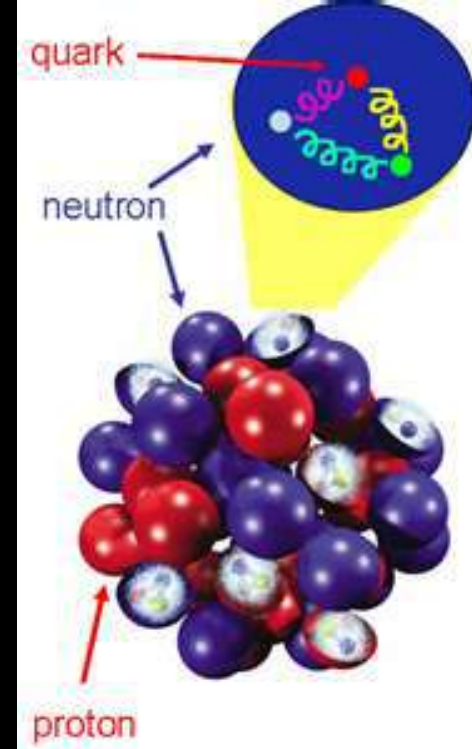


history of atomic models

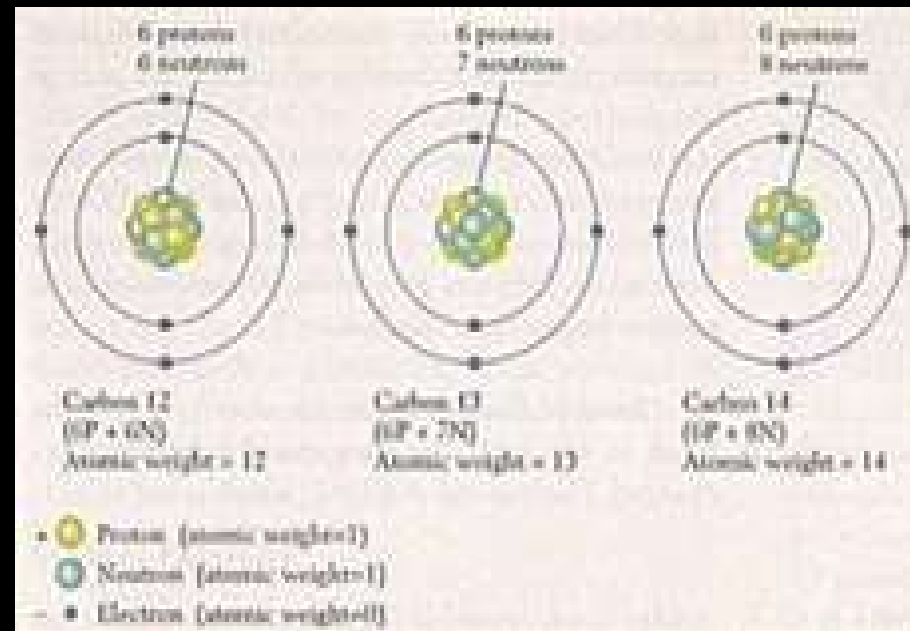
- 1803: John Dalton concluded that all matter is made of atoms.
- 1904: J.J. Thomson discovered electrons & proposed the “plum pudding model”
- 1911: Earnest Rutherford discovered the nucleus.
- 1913: Neils Bohr proposed that electrons orbit with electrostatic forces rather than gravity. the “planetary model”
- 1926: Erwin Schrodinger analyzed electron orbits from a geometric point using quantum physics,



- Quarks – small particles that make up protons and neutrons. 3 quarks held together by the strong nuclear force (p^+ or n^0).
- Isotopes - Atoms of the same element with different numbers of neutrons.

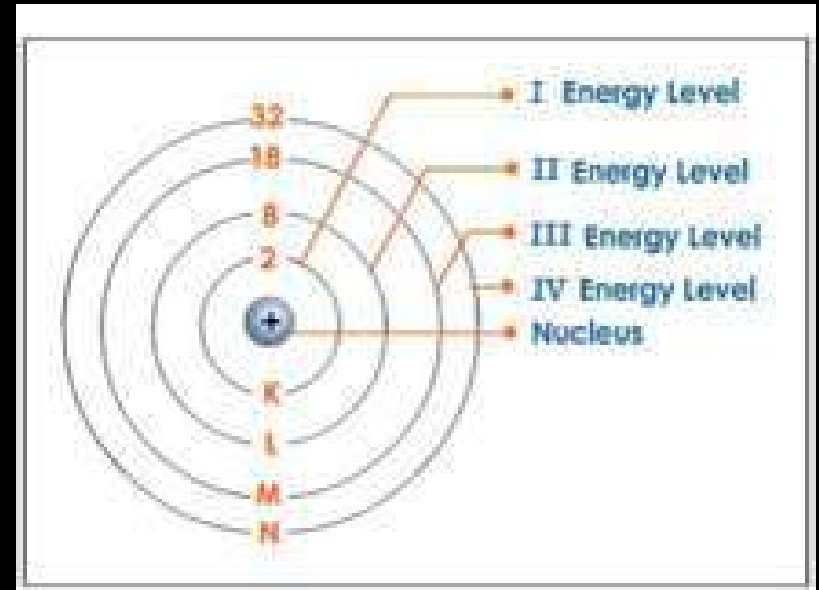


[isotopes video clip](#)



Electron energy levels

- 1st level = maximum 2
- 2nd level = maximum 8
- 3rd level = maximum 18
- 4th level = maximum 32
- 5th level = maximum 32
- 6th level = maximum 18
- 7th level = maximum 8
- Valence electrons (very outside ring) can never exceed 8 electrons



Periodic Table of the Elements

we will learn how to interpret the table & learn the most important element symbols.

- The symbol: 1st letter is capital, 2nd letter is lower case. *(most symbols are in Latin)*

- Atomic Number = # of protons, or # of electrons.

(in a stable atom, the # of protons is equal to the number of electrons)

Ex: Lithium has 3 p^+ & 3 e^-

- Atomic mass/weight = # of protons plus # of neutrons. *(avg. is due to isotopes)*

Ex: Lithium 7 has 4 neutrons. $7 - 3 = 4$

Lithium 6 has 3 neutrons. $6 - 3 = 3$

3
Li
6.94

Periodic Table of the Elements

- The column is called a group or family
(all elements in a family have similar characteristics)
- The number above the column is the group number and identifies the # of valence electrons.
- The element at the top of the column is the family name.
- The row is called a period & tells how many rings of electrons the atom has.

Periodic Table of the Elements																18 VIIIA He	

Mendeleev arranged the elements in the table by increasing atomic number/atomic mass/number of protons.

Periodic Table of the Elements																	
1 IA 11A																	18 VIIIA 8A
1 H Hydrogen 1.008	2 IIA 2A											13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	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	3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8 VIII 8	9 VIII 8	10 VIII 8	11 IB 1B	12 IIB 2B	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 55.933	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.732	32 Ge Germanium 72.61	33 As Arsenic 74.922	34 Se Selenium 78.09	35 Br Bromine 79.904	36 Kr Krypton 84.80
37 Rb Rubidium 84.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	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 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.29
55 Cs Cesium 132.905	56 Ba Barium 137.327	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 [208.962]	85 At Astatine 208.987	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 [268]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Uut Ununtrium unknown	114 Fl Flerovium [289]	115 Uup Ununpentium unknown	116 Lv Livermorium [293]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown

Lanthanide Series	57 La Lanthanum 138.906	58 Ce Cerium 140.115	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.24	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.966	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.26	69 Tm Thulium 168.934	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967
Actinide Series	89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]

Alkali Metal	Alkaline Earth	Transition Metal	Semimetal	Nonmetal	Basic Metal	Halogen	Noble Gas	Lanthanide	Actinide
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Periodic Table of the Elements

- Metals: good conductors, shiny, malleable, & ductile
- Non-metals: poor conductors, dull, & brittle or powdery
- Noble Gases – group 18 (He family), stable atoms, do not naturally form compounds
- Metalloids: some characteristics of metals & some of non-metals

Periodic Table of the Elements

Legend:

- Alkali Metal
- Alkaline Earth
- Transition Metal
- Semimetal
- Nonmetal
- Basic Metal
- Halogen
- Noble Gas
- Lanthanide
- Actinide

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ChemicalElements.com - An Interactive Periodic Table of the Elements

6 most common elements found in living things:

- Carbon
- Hydrogen
- Oxygen
- Nitrogen
- Phosphorous
- Sulfur

The main element in all organic compounds is Carbon
(more on compounds in our next unit)