

Periodic Trends

- The arrangement of the periodic table allows us to make predictions about an elements' chemical behavior
- Just like a large grocery or department store, the elements (or items in a store) are situated by their trends

The Periodic Table

PERIODIC TABLE OF THE ELEMENTS

<http://www.ktf-split.hr/periodni/en/>

PERIOD	GROUP																		
	1 IA	2 IIA	GROUP IUPAC										13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	1.0079 H HYDROGEN																	4.0026 He HELIUM	
2	6.941 Li LITHIUM	9.0122 Be BERYLLIUM			10.811 B BORON								10.811 B BORON	12.011 C CARBON	14.007 N NITROGEN	15.999 O OXYGEN	18.998 F FLUORINE	20.180 Ne NEON	
3	22.990 Na SODIUM	24.305 Mg MAGNESIUM											26.982 Al ALUMINIUM	28.086 Si SILICON	30.974 P PHOSPHORUS	32.065 S SULPHUR	35.453 Cl CHLORINE	39.948 Ar ARGON	
4	39.098 K POTASSIUM	40.078 Ca CALCIUM	44.956 Sc SCANDIUM	47.867 Ti TITANIUM	50.942 V VANADIUM	51.996 Cr CHROMIUM	54.938 Mn MANGANESE	55.845 Fe IRON	58.933 Co COBALT	58.693 Ni NICKEL	63.546 Cu COPPER	65.39 Zn ZINC	69.723 Ga GALLIUM	72.64 Ge GERMANIUM	74.922 As ARSENIC	78.96 Se SELENIUM	79.904 Br BROMINE	83.80 Kr KRYPTON	
5	85.468 Rb RUBIDIUM	87.62 Sr STRONTIUM	88.906 Y YTTORIUM	91.224 Zr ZIRCONIUM	92.906 Nb NIObIUM	95.94 Mo MOLYBDENUM	(98) Tc TECHNETIUM	101.07 Ru RUTHENIUM	102.91 Rh RHODIUM	106.42 Pd PALLADIUM	107.87 Ag SILVER	112.41 Cd CADMIUM	114.82 In INDIUM	118.71 Sn TIN	121.76 Sb ANTIMONY	127.60 Te TELLURIUM	126.90 I IODINE	131.29 Xe XENON	
6	132.91 Cs CAESIUM	137.33 Ba BARIUM	57-71 La-Lu Lanthanide	178.49 Hf HAFNIUM	180.95 Ta TANTALUM	183.84 W TUNGSTEN	186.21 Re RHENIUM	190.23 Os OSMIUM	192.22 Ir IRIDIUM	195.08 Pt PLATINUM	196.97 Au GOLD	200.59 Hg MERCURY	204.38 Tl THALLIUM	207.2 Pb LEAD	208.98 Bi BISMUTH	(209) Po POLONIUM	(210) At ASTATINE	(222) Rn RADON	
7	(223) Fr FRANCIUM	(226) Ra RADIUM	89-103 Ac-Lr Actinide	(261) Rf RUTHERFORDIUM	(262) Db DUBNIUM	(266) Sg SEABORGIUM	(264) Bh BOHRIUM	(277) Hs HASSIUM	(268) Mt MEITNERIUM	(281) Uun UNUNNIUM	(272) Uuu UNUNUNIUM	(285) Uub UNUNBIUM							

Legend:

- Metal
- Semimetal
- Nonmetal

Standard State (25 °C, 101 kPa):

- Ne - gas
- Fe - solid
- Ga - liquid
- Tc - synthetic

Relative Atomic Mass (1)

GROUP IUPAC

ATOMIC NUMBER

SYMBOL

ELEMENT NAME

LANTHANIDE

57 138.91 La LANTHANUM	58 140.12 Ce CERIUM	59 140.91 Pr PRASEODYMIUM	60 144.24 Nd NEODYMIUM	61 (145) Pm PROMETHIUM	62 150.36 Sm SAMARIUM	63 151.96 Eu EUROPIUM	64 157.25 Gd GADOLINIUM	65 158.93 Tb TERBIUM	66 162.50 Dy DYSPROSIUM	67 164.93 Ho HOLMIUM	68 167.26 Er ERBIUM	69 168.93 Tm THULIUM	70 173.04 Yb YTTERIUM	71 174.97 Lu LUTETIUM
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ACTINIDE

89 (227) Ac ACTINIUM	90 232.04 Th THORIUM	91 231.04 Pa PROTACTINIUM	92 238.03 U URANIUM	93 (237) Np NEPTUNIUM	94 (244) Pu PLUTONIUM	95 (243) Am AMERICIUM	96 (247) Cm CURIUM	97 (247) Bk BERKELIUM	98 (251) Cf CALIFORNIUM	99 (252) Es EINSTEINIUM	100 (257) Fm FERMIUM	101 (258) Md MENDELEVIUM	102 (259) No NOBELIUM	103 (262) Lr LAWRENCIUM
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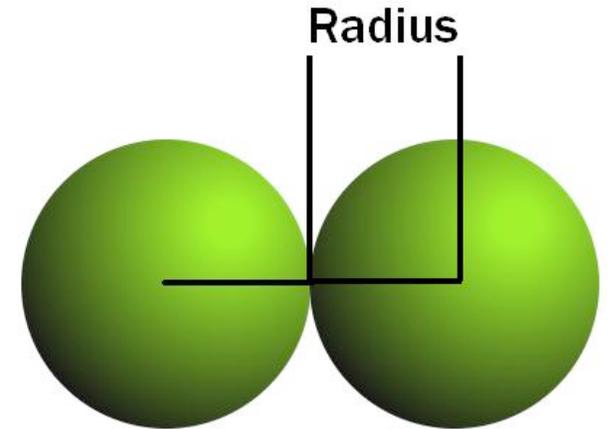
(1) Pure Appl. Chem., 73, No. 4, 667-683 (2001)
Relative atomic mass is shown with five significant figures. For elements having no stable nuclides, the value enclosed in brackets indicates the mass number of the longest-lived isotope of the element.
However three such elements (Th, Pa, and U) do have a characteristic terrestrial isotopic composition, and for these an atomic weight is tabulated.

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Atomic Radius



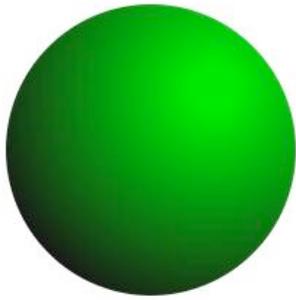
- Half of the distance from the center to center of two like atoms that are bonded together
- Increases as you move down a group
 - Increasing principal energy levels ($n=1, 2, 3, \dots$)
 - Greater electron shielding from more electrons
 - Kernel (inner shell) electrons
- Decreases as you move across a period
 - Nuclear charge increases (more protons)
 - Electron shielding is constant



Ionization Energy



- The energy required to remove an electron from an atom or ion (first ionization energy)
- Decreases as you move down a group
 - More energy levels are filled, valence electrons are further from the attractive forces of nucleus
 - Greater electron shielding
- Increases as you move across a period
 - Adding more protons (positive) and electrons (negative)
 - (Magnets)
 - Same energy level (n), therefore no increase in electron shielding



Francium

Electronegativity



Fluorine

- The ability of an atom to attract electrons in a chemical bond
- Decreases as you move down a group
 - Increasing atomic radius, valence electrons farther away from nucleus (less energy to remove electron)
- Increases as you move across a period
 - Decreasing atomic radius, valence electrons closer to nucleus (more energy to remove electron)

Ionic Radius

- An atom or bonded group of atoms that have a (+) or (-) charge
- Moving across a period positive ions become smaller due to the loss of valence electrons and a decrease in electrostatic repulsion of the remaining electrons
 - Moving across a period negative ions become smaller
- Moving down a group ionic radii increases
 - See 'atomic radius'