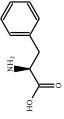
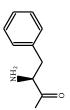


Deriodic Table of the Elements





18	$\overset{2}{He}_{\overset{\text{helium}}{\text{helium}}}$	$\mathop{Ne}_{\atop{\tiny neon \atop 20.18}}$	$\mathop{\mathrm{Ar}}_{{}^{18}}$	$\overset{36}{\mathrm{Kr}}$ krypton 83.798	54 Xenon 131.29	$\mathop{Rn}\limits_{{}^{radon}^{(222)}}$	$\mathop{\rm Oganesson}_{(294)}$
	17	9 F fluorine 18.998	C1 chlorine 35.4515	$\frac{35}{\mathbf{Br}}$ bromine	53 Iodine 126.9	$\mathop{\mathrm{At}}_{\text{astatine}}$	$\prod_{\text{tennessine}\atop{(294)}}$
	16	8 O oxygen 15.9995	16 S sulfur 32.0675	Se selenium 78.971	$\prod_{\substack{tellurium\\127.6}}^{52}$	PO polonium (209)	$\sum_{\substack{\text{livermorium}\\(293)}}$
	51	$\sum_{\substack{nitrogen\\14.007}}^{7}$	$\Pr_{\substack{\text{phosphorus}\\30.974}}$	${\overset{33}{AS}}$	$\mathop{Sb}_{\text{antimony}}$	$\overset{83}{ ext{Bi}}$ bis $^{208.98}$	MC moscovium (290)
	4١	6 carbon 12.0105	Silicon 28.085	$\overset{32}{\text{Ge}}_{\text{germanium}}$	$\displaystyle \mathop{\sum_{\mathrm{tin}}^{50}}_{\mathrm{tin}}$	$\Pr_{\text{lead}\atop 207.2}^{82}$	FI Herovium (289)
	13	$\mathop{B}_{\text{boron}}$	$\mathop{A1}\limits_{\substack{\text{aluminium}\\26.982}}$	$\overset{31}{\operatorname{Ga}}$	$\lim_{\substack{n ext{indium} \\ 114.82}}$	81 T1 thallium 204.385	$\mathop{Nh}_{\text{nihonium}}$
			12	$\sum_{\substack{zinc\\65.38}}^{30}$	$\overset{\scriptscriptstyle{48}}{\text{Cadmium}}$	$\mathop{Hg}\limits_{\stackrel{\text{mercury}}{\text{200.59}}}$	$\mathop{c_{opernicium}^{112}}_{(285)}$
			E	$\overset{29}{Cu}_{\overset{\operatorname{copper}}{63.546}}$	$\mathop{\mathrm{Ag}}_{\substack{\text{silver}\\107.87}}$	$\mathop{Au}_{{}_{\text{gold}}}^{79}$	$\mathop{Rg}\limits_{\text{roentgenium}\atop (282)}$
			01	$\overset{28}{\overset{\text{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}{\overset{nickel}}}{\overset{nickel}}}{\overset{nickel}}{\overset{nickel}}}{\overset{nickel}}}{\overset{nickel}}}{nickel$	$\Pr_{\text{palladium}}^{46}$	$\Pr_{\substack{\text{platinum}\\195.08}}$	DS darmstadtium ro
			6	27 CO cobalt 58.933	$\mathop{Rh}\limits_{^{\text{rhodium}}}$	$\prod_{ ext{iridium}}^{77}$	$M_{\rm reitnerium}^{109}$
			∞	26 Fe iron 55.845	$\mathop{Ru}\limits_{^{\text{ruthenium}}}$	OS osmium 190.23	$\mathop{Hsssium}\limits_{\text{(269)}}$
		Z: atomic number Sy: symbol element: element name saw: standard atomic weight†	7	$\mathop{Min}_{\text{manganese}}^{25}$	$\prod_{\substack{\text{technetium}\\ (97)}}^{43}$	$\mathop{Re}_{{}^{\text{rhenium}}}^{75}$	$\underset{\text{bohrium}}{Bh}$
		Z: atomic number Sy: symbol element: element name saw: standard atomic w	Q	$\displaystyle \mathop{C_{\rm chromium}^{24}}_{51.996}$	${\displaystyle \stackrel{42}{\mathrm{MO}}}_{\text{molybdenum}}$	W tungsten 183.84	$\mathop{\mathrm{Sg}}_{\text{seaborgium}}$
		$\sum_{\substack{Z\\ element\\ saw}}$	2	$\sum_{\text{vanadium}}^{23}$	ND niobium	$\overset{73}{\Gamma a}$ tantalum $_{180.95}$	Db dubnium (268)
			4	$\prod_{titanium}^{22}$	$\sum_{{ m zirconium} \atop 91.224}^{40}$	Hf	$\mathop{Rf}_{\text{rutherfordium}}$
			3	SC scandium 44.956	39 Y yttrium 88.906	* lanthanides	** actinides
	2	$\mathop{Be}_{\text{beryllium}}^{4}$	$\mathop{\rm Mg}_{{}^{\text{magnesium}}_{24.3055}}$	$\overset{20}{Ca}$	Sr strontium 87.62	$\mathop{Ba}\limits_{\substack{barium\\barium\\137.33}}$	$\mathop{Ra}\limits_{\tiny{radium}\atop{(226)}}$
Group 1	H hydrogen 1.008	2 Lithium 6.9675	$\overset{11}{\overset{\text{Na}}{\overset{\text{Sodium}}{\overset{\text{22.99}}{\overset{\text{22.99}}{\overset{}}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}}{\overset{}{\overset{}}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}{\overset{}}{\overset{}}{\overset{}{\overset{}}{\overset{}{\overset{}}{\overset{}}{\overset{}{\overset{}}{}{\overset{}}}{\overset{}}{\overset{}}{\overset{}}{\overset{}}{\overset{}}}{\overset{}}{\overset{}}{\overset{}}{\overset{}}{\overset{}}{\overset{}}}{\overset{}}{\overset{}}{\overset{}}{\overset{}}{\overset{}}{}{}{}}{\overset{}}{}}{\overset{}{}}{}}{\overset{}{}{}}{}}{\overset{}{}}{}}{\overset{}}{}}{\overset{}{}}{}{}}{}{}}{\overset{}}{}}{\overset{}}{}}{}}{\overset{}{}{}}{}}{}}{\overset{}}{}}{\overset{}}{}}{}}{\overset{}}{}}{}}{}}{}{}}{\overset{}{}}{}}{}}{}}{}{}}{\overset{}}{}}{}}{\overset{}{}{}}{}}{}}{\overset{}{}}{}}{\overset{}{}}{}}{}}{}{}}{\overset{}}{}}{\overset{}{}}{}{}}{}{}}{}}{\overset{}{}}{}{}}{}}{\overset{}}{}}{\overset{}{}}{}}{\overset{}{}{}}{}}{}}{}{}}{}{}}{}}{\overset{}{}}{}{}{}}{}}{}}{$	19 K potassium 39.098	Rb rubidium 85.468	SS Caesium 132.91	$\frac{87}{\text{Fr}}$ francium (223)

$\sum_{\substack{\text{lutetium} \\ 174.97}}$	$\frac{103}{\mathbf{L}\mathbf{r}}$ lawrencium (266)
$\sum_{\text{ytterbium}}^{70}$	NO nobelium (259)
69 Tm thulium 168.93	$\overset{\text{101}}{\underset{\text{mendelevium}}{\text{Md}}}$
68 ET erbium 167.26	Fm fermium (257)
67 HO holmium 164.93	ES einsteinium (252)
66 Dy dysprosium 162.5	Cf californium (251)
$\prod_{\substack{\text{terbium}\\158.93}}$	$\underset{(247)}{Bk}$
$\overset{\text{64}}{\text{Gd}}$	$\mathop{can'ium}\limits_{(247)}$
$\stackrel{63}{\mathrm{Eu}}_{\scriptstyle{\mathrm{uropium}}}$	$\mathop{Am}\limits_{{}^{americium}_{(243)}}$
$\mathop{\mathrm{Sm}}_{samarium}^{62}$	$\Pr_{\text{plutonium}\atop{(244)}}$
$\Pr_{promethium\atop(145)}^{61}$	$\mathop{Np}\limits_{\substack{p \\ \text{neptunium} \\ (237)}}$
60 Nd neodymium 144.24	92 U uranium 238.03
$\Pr_{140.91}^{59}$	$\Pr_{\substack{\text{protactinium}\\231.04}}$
$\mathop{\mathrm{Ce}}_{cerium}^{58}$	$\prod_{\substack{\text{thorium}\\232.04}}$
$\mathop{La}_{\text{lanthanum}}^{57}$	AC actinium (227)
*	* *

†Standard atomic weights (average terrestrial atomic weight) taken from the Commission on Isotopic Abundances and Atomic Weights (http://www.ciaaw.org/abridged-atomic-weights.htm). If CIAAW indicates a range for the standard atomic weight of an element, I used the arithmetic mean of the boundaries of the range. Elements with atomic weight in parentheses (e.g., Francium (223)) have no known stable isotopes and it is therefore impossible to propose a representative isotope is provided. Inspired by Ivan Griffinis BigA Periodic Table. BigCode is released under the MIT open source license. Inspired by Ivan Griffinis BigA Periodic Table. BigCode is released under the MIT open source license. Final product (this Table) is released under creative commons attribution/share-alike copyright terms. @@@ 2019. Paul N. Danese



Abbreviations:

• atm: atmosphere

• g, mg: gram, milligram

• K: Kelvin

- L, mL: liter, milliliter

• M: Molar / molarity

• mmHg: millimeters of mercury

• mol: mole

Moles, conversion, pH, and other stuff:

• 1 mole =
$$6.0221 \times 10^{23}$$
 things

• Kelvin =
$$^{\circ}$$
C + 273.15

•
$${}^{\circ}F = 1.8 \times {}^{\circ}C + 32$$

•
$${}^{\circ}C = \frac{({}^{\circ}F - 32)}{1.8}$$

•
$$pH = -1 \times log[H_3O^+]$$

•
$$1000 \, mL = 1 \, L$$

•
$$1000 g = 1 kg$$

•
$$1 \, \text{mL} = 1 \, \text{cm}^3$$

• density =
$$\frac{\text{mass}}{\text{volume}}$$

Concentration equations:

•
$$\%(m/m) = \frac{mass \text{ of solute}}{mass \text{ of solution}} \times 100$$

•
$$\%(v/v) = \frac{\text{volume of solute}}{\text{volume of solution}} \times 100$$

•
$$\%(m/v) = \frac{mass \text{ of solute in grams}}{volume \text{ of solution in } mL} \times 100$$

• Molarity =
$$\frac{\text{number of moles of solute}}{\text{number of Liters of solution}}$$

Gas equations:

• Boyle's Law: $P_1V_1 = P_2V_2$

- Charles's Law:
$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

• Gay-Lussac's Law:
$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

• Combined gas Law:
$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

• Avogadro's Law:
$$\frac{V_1}{n_1} = \frac{V_2}{n_2}$$

• Universal gas constant:
$$R = \frac{0.0821 Latm}{mol K}$$

• Ideal gas Law: PV = nRT