Periodic Table of Elements

groups (CAS):

I A	Alkali metals
II A	Alkaline earths
I B	Coinage metals
III A	Boron group
IV A	Carbon group
V A	Pnictogens
VI A	Chalcogens
VII A	Halogens
VIII A	Noble gases

A: main groups
B: transition elements

UIPAC: number groups 1–18

categories:

- nonmetal
- alkali metal
- alkaline earth metal
- lanthanide
- actinide
- transition metal
- post-transition metal
- metalloid
- halogen
- noble gas

79.904: atomic weight
aka. "relative atomic mass"
(average over isotopes)

79: mass number (A):
number of nucleons
(most common isotope)

35: atomic number (Z):
number of protons
(= number of electrons)

electron configuration:
[Ar] $3d^{10}\ 4s^2\ 4p^5$
valence electrons in blue

Madelung ordering rule: (n+l, n)
⇒ 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d, 7p, ...

state of matter:
○ gaseous
◒ liquid
☘ radioactive

I=3/2: nuclear spin of most common isotope.
When I = 0 for most common isotope , shows "*Z*: I=*l*" for most common isotope with I ≠ 0.
E.g. for $^{24}_{12}$Mg: I=0, but for $^{25}_{12}$Mg: I=5/2.

Nuclear spin rules: based on Z, N=A-Z
even/even: I=0; odd/odd: integer I;
even/odd or odd/even: half-integer I

I A	II A	III B	IV B	V B	VI B	VII B	— VIII B —		I B	II B	III A	IV A	V A	VI A	VII A	VIII A	Period
1.0079 ○ $^{1}_{1}$H I=1/2 Hydrogen																4.0026 ○ $^{4}_{2}$He 3: I=1/2 Helium	1
6.9410 $^{7}_{3}$Li I=3/2 Lithium	9.0122 $^{9}_{4}$Be I=3/2 Beryllium										10.811 $^{11}_{5}$B I=3/2 Boron	12.011 $^{12}_{6}$C 13: I=1/2 Carbon	14.007 ○ $^{14}_{7}$N I=1 Nitrogen	15.999 ○ $^{16}_{8}$O 17: I=5/2 Oxygen	18.998 ○ $^{19}_{9}$F I=1/2 Fluorine	20.180 ○ $^{20}_{10}$Ne 21: I=3/2 Neon	2
22.990 $^{23}_{11}$Na I=3/2 Sodium	24.305 $^{24}_{12}$Mg 25: I=5/2 Magnesium										26.982 $^{27}_{13}$Al I=5/2 Aluminum	28.085 $^{28}_{14}$Si 29: I=1/2 Silicon	30.974 $^{31}_{15}$P I=1/2 Phosphorus	32.065 $^{32}_{16}$S 33: I=3/2 Sulfur	35.453 ○ $^{35}_{17}$Cl I=3/2 Chlorine	39.948 ○ $^{40}_{18}$Ar 39: I=7/2 Argon	3
39.098 $^{39}_{19}$K I=3/2 Potassium	40.078 $^{40}_{20}$Ca 43: I=7/2 Calcium	44.956 $^{45}_{21}$Sc I=7/2 Scandium	47.867 $^{48}_{22}$Ti 47: I=5/2 Titanium	50.941 $^{51}_{23}$V I=7/2 Vanadium	51.996 $^{52}_{24}$Cr 53: I=3/2 Chromium	54.938 $^{55}_{25}$Mn I=5/2 Manganese	55.845 $^{56}_{26}$Fe 57: I=1/2 Iron	58.933 $^{59}_{27}$Co I=7/2 Cobalt	58.693 $^{58}_{28}$Ni 61: I=3/2 Nickel	63.546 $^{63}_{29}$Cu I=3/2 Copper	65.380 $^{64}_{30}$Zn 67: I=5/2 Zinc	69.723 $^{69}_{31}$Ga I=3/2 Gallium	72.640 $^{74}_{32}$Ge 73: I=9/2 Germanium	74.922 $^{75}_{33}$As I=3/2 Arsenic	78.960 $^{80}_{34}$Se 77: I=1/2 Selenium	79.904 ◒ $^{79}_{35}$Br I=3/2 Bromine	83.798 ○ $^{84}_{36}$Kr 83: I=9/2 Krypton	4
85.468 $^{85}_{37}$Rb I=5/2 Rubidium	87.620 $^{88}_{38}$Sr 87: I=9/2 Strontium	88.906 $^{89}_{39}$Y I=1/2 Yttrium	91.224 $^{90}_{40}$Zr 91: I=5/2 Zirconium	92.906 $^{93}_{41}$Nb I=9/2 Niobium	95.960 $^{98}_{42}$Mo 95: I=5/2 Molybdenum	98.000 ☘ $^{98}_{43}$Tc 99: I=9/2 Technetium	101.07 $^{102}_{44}$Ru 101: I=5/2 Ruthenium	102.91 $^{103}_{45}$Rh I=1/2 Rhodium	106.42 $^{106}_{46}$Pd 105: I=5/2 Palladium	107.87 $^{107}_{47}$Ag I=1/2 Silver	112.41 $^{114}_{48}$Cd 111: I=1/2 Cadmium	114.82 $^{115}_{49}$In I=9/2 Indium	118.71 $^{120}_{50}$Sn 119: I=1/2 Tin	121.76 $^{121}_{51}$Sb I=5/2 Antimony	127.60 $^{130}_{52}$Te 125: I=1/2 Tellurium	126.90 $^{127}_{53}$I I=5/2 Iodine	131.29 ○ $^{132}_{54}$Xe 129: I=1/2 Xenon	5
132.91 $^{133}_{55}$Cs I=7/2 Cesium	137.33 $^{138}_{56}$Ba 137: I=3/2 Barium	138.91 $^{139}_{57}$La I=7/2 Lanthanum	140.12 $^{140}_{58}$Ce I=0 Cerium	140.91 $^{141}_{59}$Pr I=5/2 Praseodymium	144.24 $^{142}_{60}$Nd 143: I=7/2 Neodymium	145.00 ☘ $^{145}_{61}$Pm 147: I=7/2 Promethium	150.36 $^{152}_{62}$Sm 147: I=7/2 Samarium	151.96 $^{153}_{63}$Eu I=5/2 Europium	157.25 $^{158}_{64}$Gd 157: I=3/2 Gadolinium	158.93 $^{159}_{65}$Tb I=3/2 Terbium	162.50 $^{164}_{66}$Dy 163: I=5/2 Dysprosium	164.93 $^{165}_{67}$Ho I=7/2 Holmium	167.26 $^{166}_{68}$Er 167: I=7/2 Erbium	168.93 $^{169}_{69}$Tm I=1/2 Thulium	173.05 $^{174}_{70}$Yb 173: I=5/2 Ytterbium	174.97 $^{175}_{71}$Lu I=7/2 Lutetium	6
223 ☘ $^{223}_{87}$Fr Francium	226 ☘ $^{226}_{88}$Ra Radium	227 ☘ $^{227}_{89}$Ac I=3/2 Actinium	232.04 ☘ $^{232}_{90}$Th 229: I=5/2 Thorium	231.04 ☘ $^{231}_{91}$Pa Protactinium	238.03 ☘ $^{238}_{92}$U 235: I=7/2 Uranium	237 ☘ $^{237}_{93}$Np I=5/2 Neptunium	244 ☘ $^{244}_{94}$Pu 239: I=1/2 Plutonium	243 ☘ $^{243}_{95}$Am I=5/2 Americium	247 ☘ $^{247}_{96}$Cm Curium	247 ☘ $^{247}_{97}$Bk Berkelium	251 ☘ $^{251}_{98}$Cf Californium	252 ☘ $^{252}_{99}$Es Einsteinium	257 ☘ $^{257}_{100}$Fm Fermium	258 ☘ $^{258}_{101}$Md Mendelevium	259 ☘ $^{259}_{102}$No Nobelium	262 ☘ $^{262}_{103}$Lr Lawrencium	7
261 ☘ $^{261}_{104}$Rf Rutherfordium	262 ☘ $^{262}_{105}$Db Dubnium	266 ☘ $^{266}_{106}$Sg Seaborgium	264 ☘ $^{264}_{107}$Bh Bohrium	269 ☘ $^{269}_{108}$Hs Hassium	268 ☘ $^{268}_{109}$Mt Meitnerium	110 ☘ ^{110}Ds Darmstadtium	111 ☘ ^{111}Rg Roentgenium	112 ☘ ^{112}Cn Copernicium	113 ☘ ^{113}Nh Nihonium	114 ☘ ^{114}Fl Flerovium	115 ☘ ^{115}Mc Moscovium	116 ☘ ^{116}Lv Livermorium	117 ☘ ^{117}Ts Tennessine	118 ☘ ^{118}Og Oganesson			
0 (s-block)		2	3 (f-block)								2 (d-block)					1 (p-block)	l / n
0	0	+2	+3	+2	+1	0	-1	-2	-3	+3	+2	+1	0	-1	-2	-3	m_l
+1/2	-1/2	+1/2	+1/2							-1/2							m_s

2018 by Michael Goerz (https://michaelgoerz.net). This work is licensed under a Creative Commons "Attribution-NonCommercial 4.0 International" license.