

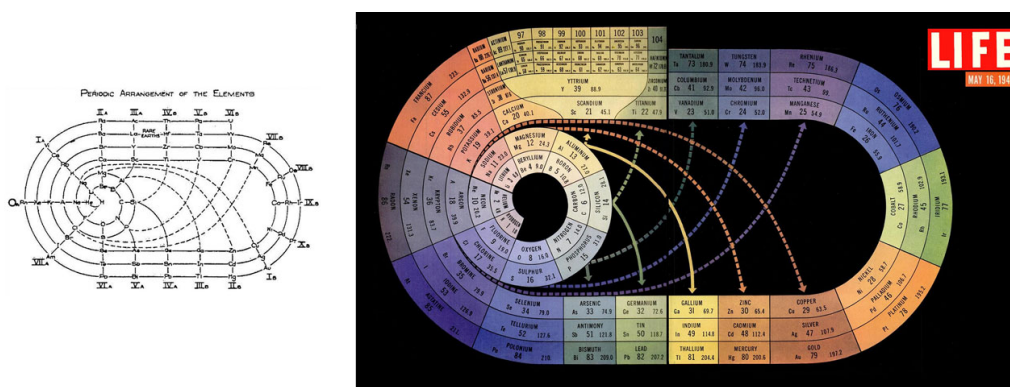
Shapes of the periodic table元素周期表的不同形式

[Shapes of the periodic table - GalChimia](#)

The Race-Track Periodic Table (1933)

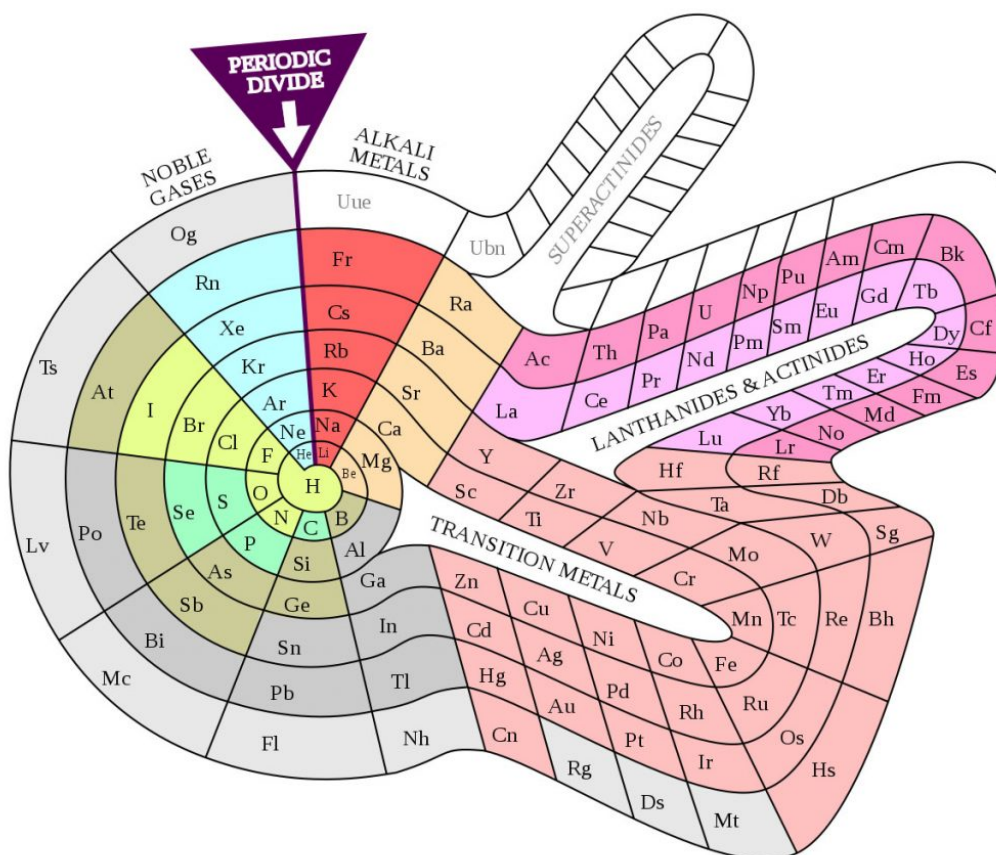
Chemist and sci-fi author John Clark created a race-track-like table in 1933 (left), whose nicely colored version became popular after LIFE magazine's issue on The Atom in 1945 (right). This irregular spiral is a systematic arrangement of the natural elements (further extended to element 104) by their number of electrons. The table is so neat that elements with similar properties appear grouped together in blocks or connected by solid arrows (see for example the inert gases on the left).

化学家、科幻小说作家John Clark于1933年设计了一种形似赛道的元素周期表（如左图），1945年，该元素周期表的彩色版本（如右图）在《生活》（LIFE）杂志（关于“原子”的一期后流行一时。这一形状为不规则螺旋形的元素周期表是对不同种元素的系统性排列。这一元素周期表将104种自然元素完美地排列起来，同族性质相似的元素在同一区域或以实线相连（例如左侧的稀有气体元素）。



The Spiral Periodic Table (1960)

Similar to the previous one, but with more of a snail shape, Theodor Benfey proposed this periodic table in the early 1960s, which also emphasizes the continuity of the elements rather than imposing artificial breaks (shown as “Periodic divide” in the image). As such, it illustrates more dramatically the different periods of 8, 18, and 32, while also allowing for the introduction of new elements (superactinides).



The Curled-Ribbon Periodic Table (1975)

This one is particularly good-looking, although probably not that practical for everyday use. It was created in 1975 by organosilicon chemist James F. Hyde, although we are here showing the reproduction made by J. Sachs in 2016. Hyde's point of view is obvious as silicon is featured right in the middle (between the two circles), showing also the connections of this element to many others in the graph (dashed lines). The list still begins with hydrogen (center of the main circle), before spiraling out into the different groups. The different colors also highlight the elements' periodic relationships.

The chemical elements and their periodic relationships
(circa 1975)

This spiral periodic table displays the chemical elements and their periodic relationships. The elements are arranged in a spiral pattern, color-coded by groups, and labeled with group numbers and electron configurations. The table includes a legend for element types (metals, metalloids, nonmetals) and a small diagram of the periodic table's shape.

Legend:

- Metals (shaded blue)
- Metalloids (shaded green)
- Nonmetals (shaded yellow)

Group Labels and Electron Configurations:

- (I A) s^1
- (II A) s^2
- (III A) $d^1 s^2$
- (IV A) $d^2 s^2$
- (V A) $d^3 s^2$
- (VI A) $d^4 s^2$
- (VII A) $d^5 s^2$
- (VIII) $d^6 s^2$
- (IX) $d^7 s^2$
- (X) $d^8 s^2$
- (XI) $d^9 s^2$
- (XII) $d^{10} s^2$
- (I B) $d^10 s^1$
- (II B) $d^10 s^2$
- (III B) $d^9 s^2$
- (IV B) $d^8 s^2$
- (V B) $d^7 s^2$
- (VI B) $d^6 s^2$
- (VII B) $d^5 s^2$
- (VIII) $d^4 s^2$
- (IX) $d^3 s^2$
- (X) $d^2 s^2$
- (XI) $d^1 s^2$
- (XII) $d^0 s^2$

Actinides and Lanthanides:

- Actinides: $5f^{1-14} 6d^{0-2} 7s^2$
- Lanthanides: $4f^{1-14} 5d^{0-2} 6s^2$

Small Diagram:

A small diagram of the periodic table's shape is shown in the top right corner, with labels for the s, p, d, and f blocks.

The Adomah Periodic Table (2006)

Also referred to as the “Perfect Periodic Table” by its designer, Valery Tsimmerman. The idea derives from a previous table by Charles Janet, who arranged the elements according to their electronic configuration in his Left-Step Periodic Table (1928). Instead, the Adomah system is set around the four quantum numbers of the electron configuration.

Two of the four quantum numbers (n and l) are reflected in the traditional periodic table. However, only the first three periods follow quantum number n . After that, the pattern breaks. The main blocks of the traditional periodic table (i.e., the s, f, d, and p blocks) are in fact presented in the order $l = 0, 3, 2, 1$, highlighting that this arrangement is indeed illogical. Of note, elements H and He are placed in two different positions to reflect their dual nature in terms of atomic structure and chemical properties.

The diagram illustrates the periodic table with orbitals filled in the order of increasing energy. The orbitals are color-coded: s (light blue), p (light green), d (pink), and f (light purple). The filling order is indicated by arrows, showing that the 4f orbitals are filled after the 5d orbitals, and the 5f orbitals are filled after the 6d orbitals. The diagram shows that the 4f orbitals are filled after the 5d orbitals, and the 5f orbitals are filled after the 6d orbitals, illustrating the lanthanide and actinide series.

l = 3 f

57 La	89 Ac	1
58 Ce	90 Th	2
59 Pr	91 Pa	3
60 Nd	92 U	4
61 Pm	93 Np	5
62 Sm	94 Pu	6
63 Eu	95 Am	7
64 Gd	96 Cm	8
65 Tb	97 Bk	9
66 Dy	98 Cf	10
67 Ho	99 Es	11
68 Er	100 Fm	12
69 Tm	101 Md	13
70 Yb	102 No	14

l = 2 d

21 Sc	39 Y	71 Lu	103 Lr	1
22 Ti	40 Zr	72 Hf	104 Rf	2
23 V	41 Nb	73 Ta	105 Db	3
24 Cr	42 Mo	74 W	106 Sg	4
25 Mn	43 Tc	75 Re	107 Bh	5
26 Fe	44 Ru	76 Os	108 Hs	6
27 Co	45 Rh	77 Ir	109 Mt	7
28 Ni	46 Pd	78 Pt	110 Ds	8
29 Cu	47 Ag	79 Au	111 Rg	9
30 Zn	48 Cd	80 Hg	112 Cn	10

l = 1 p

5 B	13 Al	31 Ga	49 In	81 Tl	113 Nh	1
6 C	14 Si	32 Ge	50 Sn	82 Pb	114 Fl	2
7 N	15 P	33 As	51 Sb	83 Bi	115 Mc	3
8 O	16 S	34 Se	52 Te	84 Po	116 Lv	4
9 F	17 Cl	35 Br	53 I	85 At	117 Ts	5
10 He	18 Ar	36 Kr	54 Xe	86 Rn	118 Og	6

l = 0 s

1 H	3 Li	11 Na	19 K	37 Rb	55 Cs	87 Fr	119 Uue	1
2 He	4 Be	12 Mg	20 Ca	38 Sr	56 Ba	88 Ra	120 Ubn	2

n 1 2 3 4 5 6 7 8

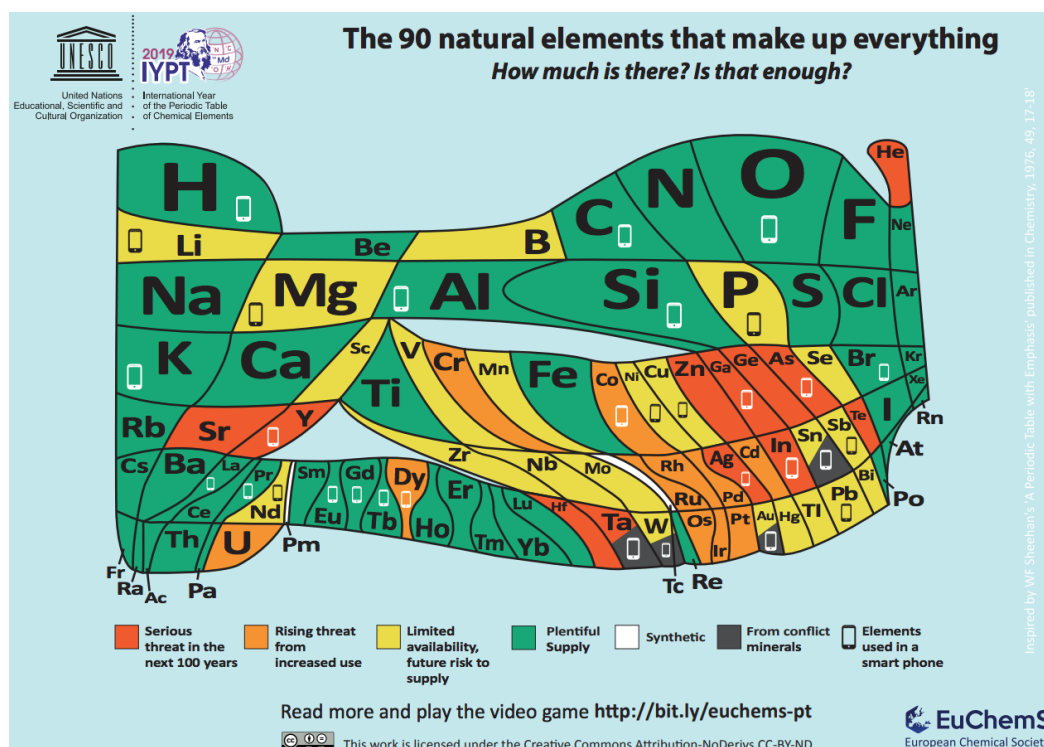
The Periodic Table of Element Scarcity (2018)

Well, this one is clearly based on the most traditional arrangement, but it is actually giving out completely different information. This is a periodic table with a purpose!

The European Chemical Society (EuChemS) has designed this table to make people reflect (and hopefully act) on the issue of element scarcity. The 90 natural elements that make up everything (literally!) have been drawn so that the area occupied by each element gives an indication of the amount of that element in the earth's crust and atmosphere. In particular, it indicates the elements used in a

smartphone (around 30!), over half of which may be in limited supply in the coming years. This is to show that we are consuming some elements very fast and their availability may become an issue unless we find ways to recycle them.

Of note is helium, the only element that is truly “lost into space”, since it is so light that escapes the planet’s gravity.



The Periodic Table of Chemical Bonds (2019)

This one we owe to mathematicians at the Max Plank Institute, who investigated almost 5000 substances containing two elements in different proportions. Each circle in this hypergraph represents the bonding an element establishes with an organic residue. The bonds are then ordered by their polarizability (where more polarized bonds place the element higher in the graph). Here, two elements can be compared either through a direct arrow (e.g., the bonds of hydrogen, for example, are more polarized than those of boron) or by the chain of arrows between them (e.g., the oxygen bonds are more polarized than those of bromine). Finally, elements in circles with the same color present similar binding behavior.

