Universidad Nacional Autónoma de México
Facultad de Química

Tabla periódica

¿Periodicidad?

Jesús Gracia Mora

Temario

CLASIFICACIÓN PERIÓDICA DE LOS ELEMENTOS.

2.1Estructura del átomo.

2.2 Partículas subatómicas: electrones, protones, neutrones.

2.3 Antecedentes históricos de la clasificación periódica: tabla de

Döbereiner, Newlands, Mendeleiev, Moseley.

2.4 Ley periódica en función de: masas atómicas, números atómicos y

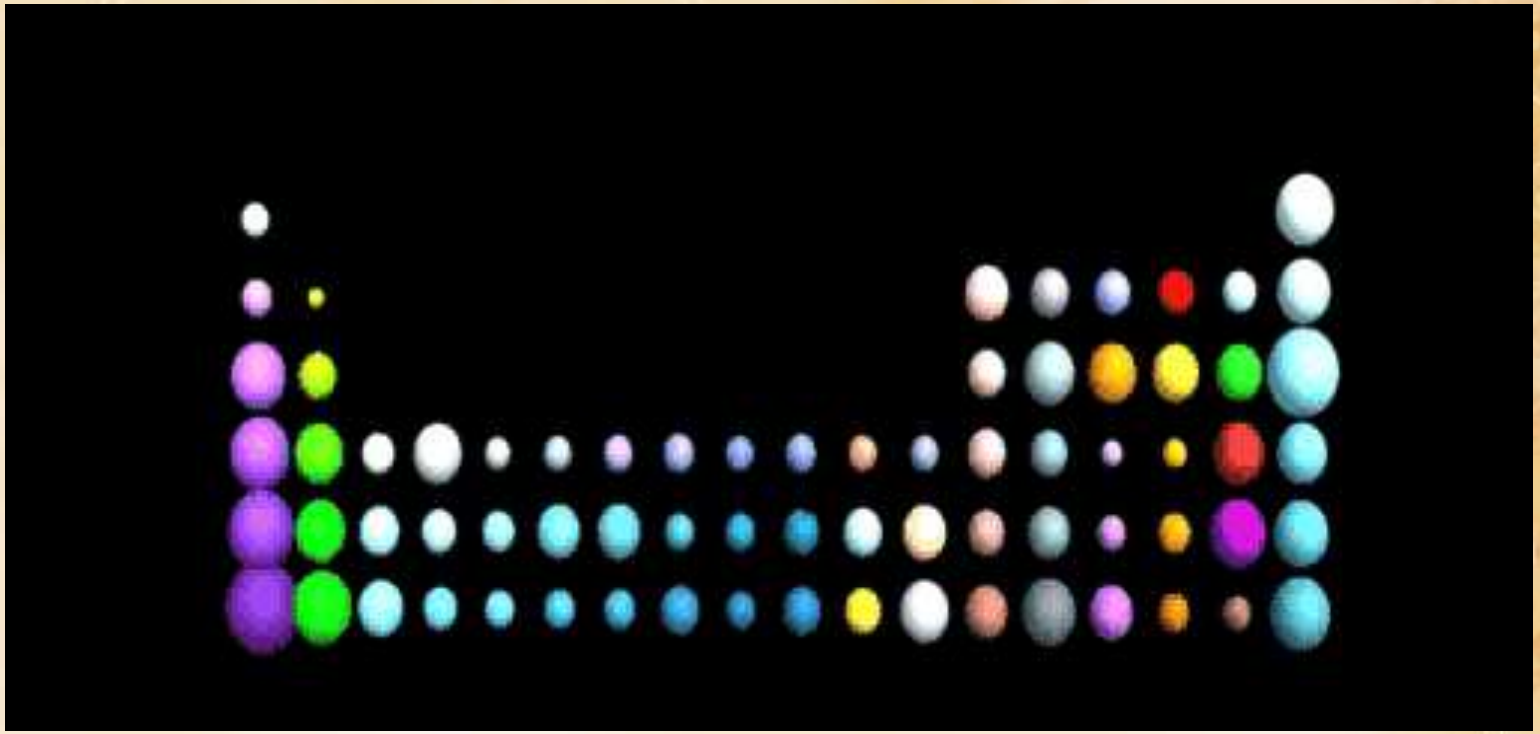
configuraciones electrónicas.

2.5 La periodicidad en la tabla larga. Familias y períodos. Puntos de fusión y ebullición, volúmenes atómicos, electronegatividades. Tipos de óxidos y

tipos de halogenuros. Valencia y estados de oxidación.

Tabla periódica

La tabla periódica es quizás las palabras con las que se asocie más comúnmente la química, se le ha considerado la piedra roseta de la naturaleza.



Estructura del átomo

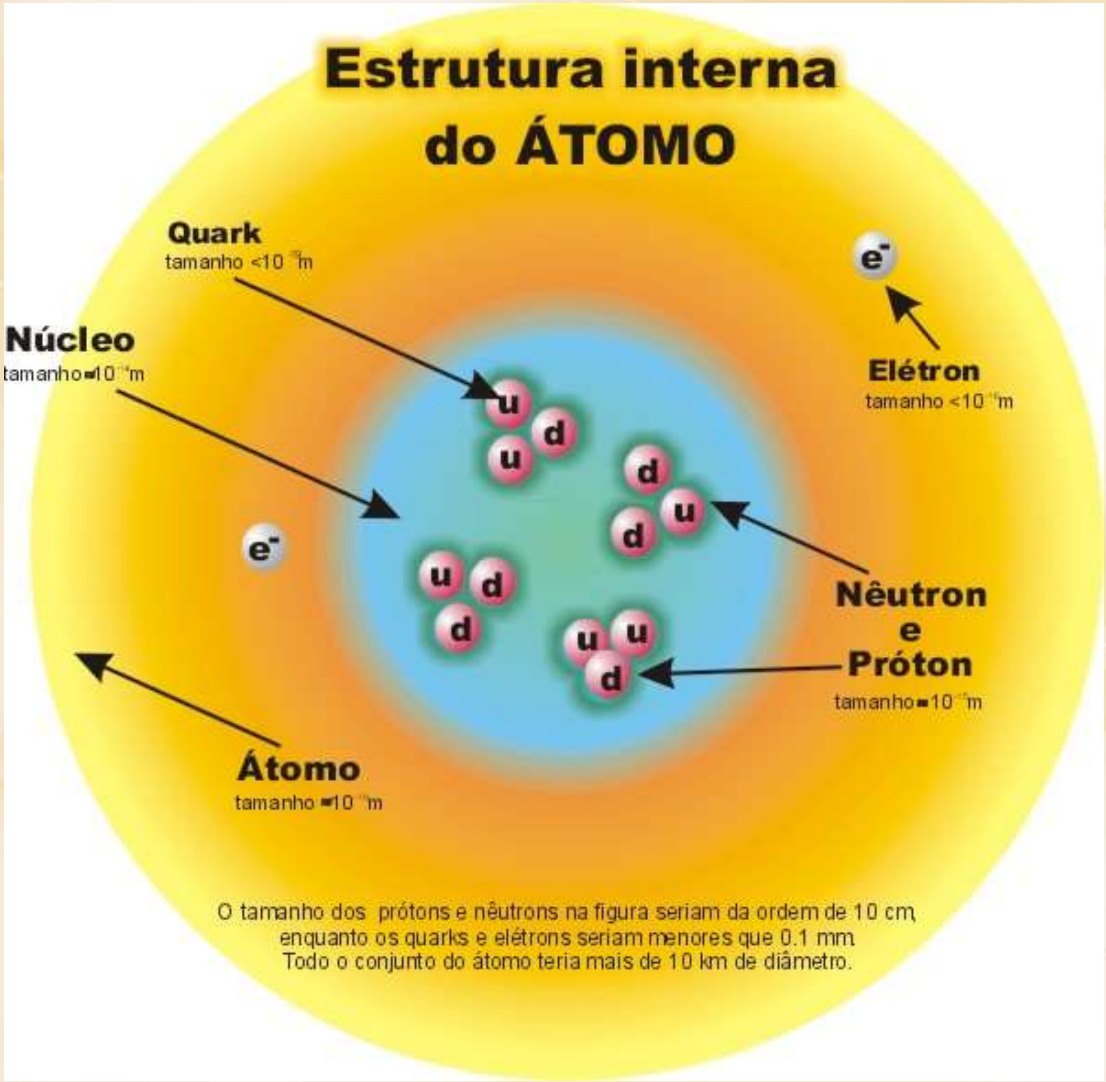


Tabla periódica

Sigue siendo un tema muy actual:

- De 1995 a 15 de feb de 2004 se publicaron 794 artículos sobre tabla periódica a todos niveles en revistas arbitradas de circulación internacional.

- Si se busca en Internet (Google) la frase “Periodic table” existen 8 490 000 sitios que lo nombran de uno u otro modo.

- Si la búsqueda se hace en español “tabla periódica” salen 569 000 sitios.

Tabla periódica

¿De dónde surge la tabla periódica?

La tabla periódica surge de la necesidad de organizar y sistematizar la información de las propiedades de los elementos.

Propiedades de diversa naturaleza, tanto físicas como químicas.

Un poco de historia

Tabla periódica

Se conocen algunos elementos de origen nativo, Fe, Au, Ag, C,….

En el siglo XVIII, N, H, O y Cl. También Co, Pt, Ni, Mn, W, Mo, U, Ti, Cr.

En la primera década del siglo XIX al menos catorce nuevos elementos. Davy y la electrólisis. Wollastron Rh, Berzelius Ce, en la siguiente década el mismo descubre Si, Zr, Th.

1830 se conocían ya 55 elementos.

Tabla periódica

Algunos elementos, como la plata y el oro, se encuentran *naturalmente* en su forma *elemental* y fueron descubiertos hace miles de años.

Algunos elementos radiactivos son extraordinariamente inestables y su aislamiento depende de la tecnología moderna.

Aunque la mayoría de los elementos son estables, pero únicamente se pueden encontrar formando compuestos con otros elementos.

En el siglo XIX, se diseñaron métodos para aislar muchos de los elementos de sus compuestos.

A partir de ese momento se aíslan cada vez más y más compuestos.

para 1800 había 31 elementos identificados

para 1865 había ya 63 elementos identificados

Tabla periódica

¿Cuántos quedaban?

Se inicia la búsqueda por un orden

Tabla periódica

Johann Wolfang Döbereiner (1780-1849)

Reconoció que el bromo tenía propiedades que parecían estar justo a la mitad entre el Cloro y yodo. Reactividad, Peso, etc. Estaban e a la mitad.

Siguió buscando y encontró Ca, Sr. Y Ba. Además S, Se, Te.

Llamó a esto triadas, los pesos encajaban muy bien, pero no impactó ya que en esa época no se le deba mucha importancia al peso atómico.

Confusión entre peso atómico y molecular.

Tabla periódica

John Alexander Reina Newlands (1837-1898)

Ordenó los elementos por pesos y observó tendencias, parecía que cada 8 se repetían las tendencias y las triadas de Döbereiner estaban dentro de esas “8” a las que llamó octavas.

Había semejanzas pero en las octavas había elementos muy dispares.

Tabla periódica

Alexander Emile Beguyer Chancoutrois

Beguyer Ordenó de forma similar los elementos y los distribuyó en un gráfico cilíndrico, sin embargo sus trabajos pasaron inadvertidos a pesar de señalar semejanzas como las que había mencionado Newlands.

Tabla periódica

Alexander Borodin

Gitinsky, Borodin, Mendeleev, and Olevinsky

Tabla periódica

Dimitri Mendeleiev

También ordenó por pesos a los elementos pero hizo contribuciones muy importantes:

Observó las variaciones de valencia

A diferencia de Newlands, no se empeñó en periodos de 8.

Propuso un orden en una tabla y no un gráfico.

Era necesario dejar huecos e hizo predicciones de propiedades de elementos no descubiertos que se cumplieron de forma espectacular.

Tabla periódica

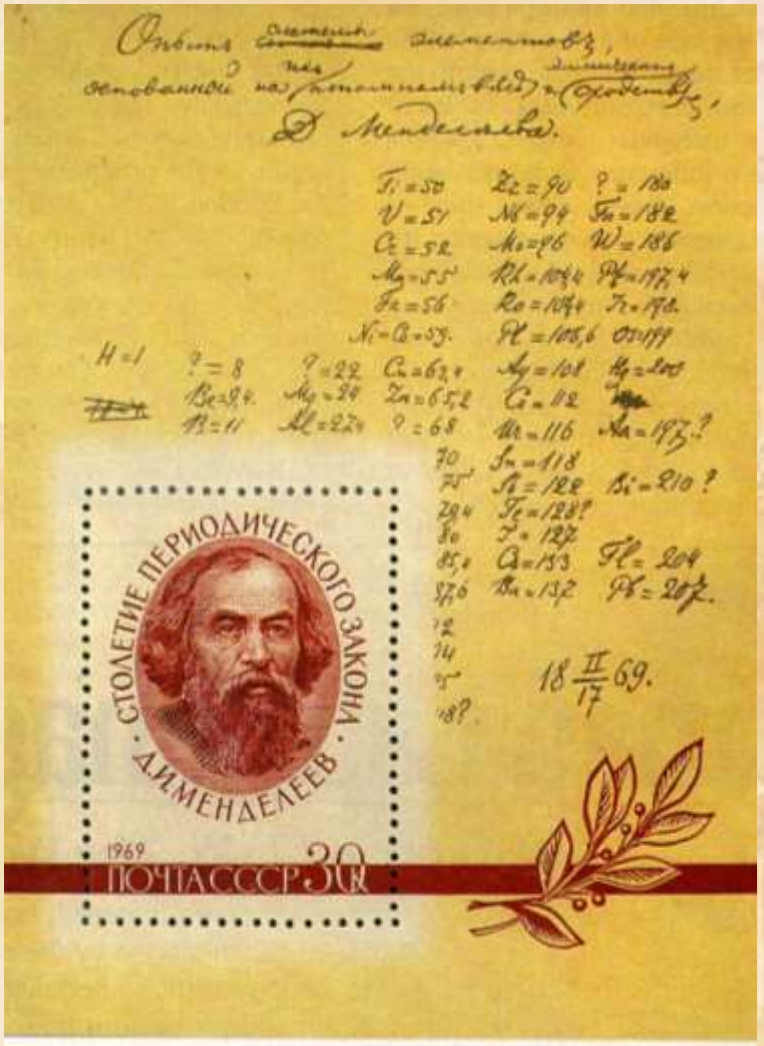


Tabla periódica

Ley periódica:

“Las Propiedades de los elementos varían en función de sus masas atómicas”

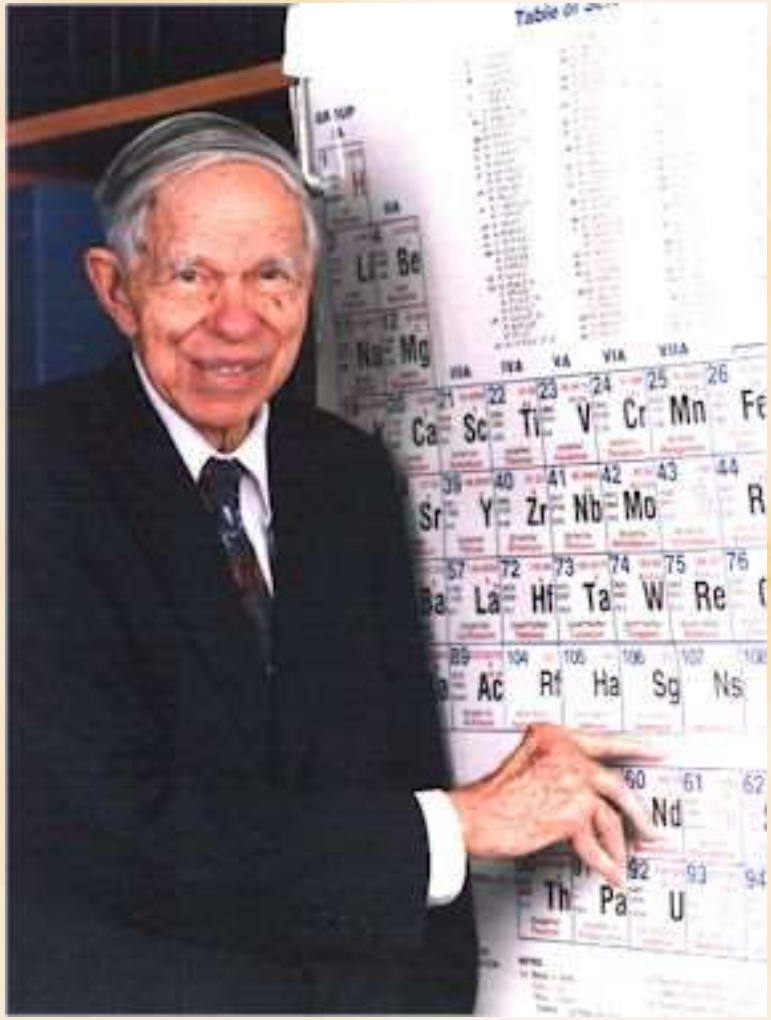
Tabla periódica

Henry Moseley (1887-1915)

Experimentó con rayos X y sirvió para sentar las bases de número atómico y no masa atómica por lo que la ley periódica se puede reformular.

“Las Propiedades de los elementos varían en función de sus números atómicos”

Tabla periódica



Glenn Seaborg

Padre de varios elementos y propone la serie de los actínidos dando origen a la tabla periódica larga

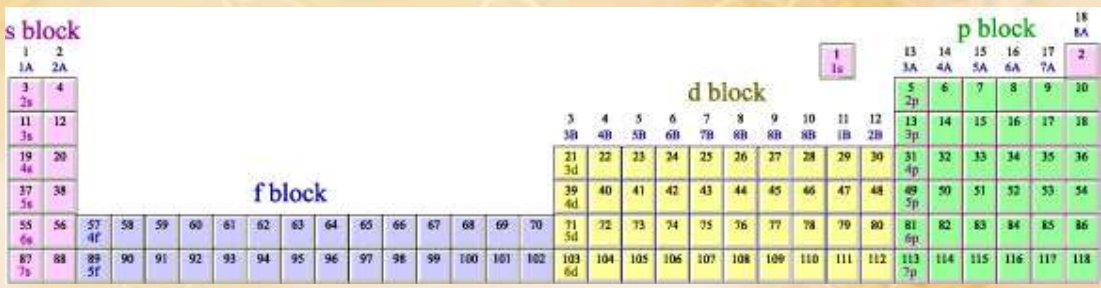
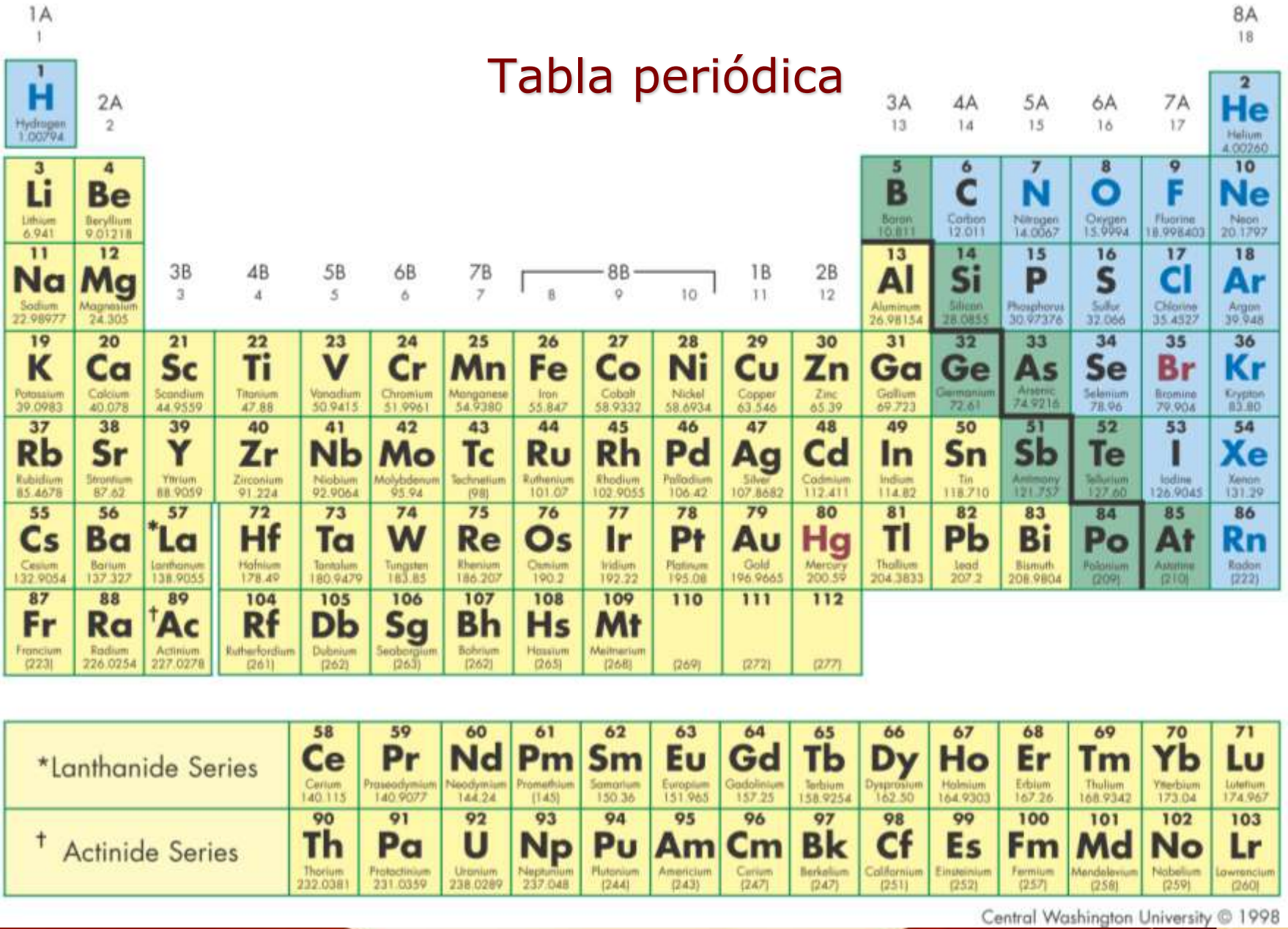
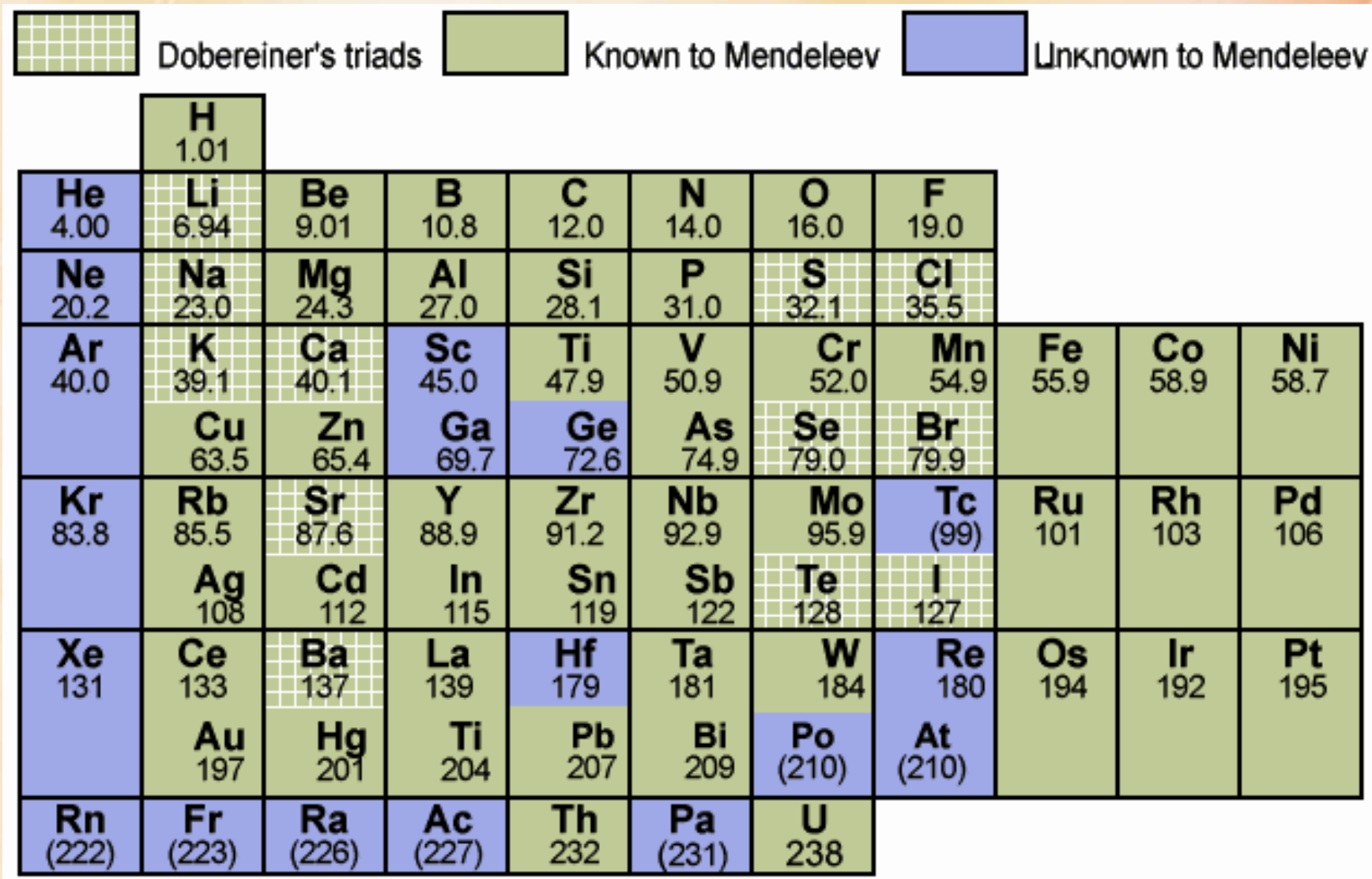


Tabla periódica




Dobereiner's triads
Known to Mendeleev
Unknown to Mendeleev
H 1.01
He 4.00
Li 6.94
Be 9.01
B 10.8
C 12.0
N 14.0
O 16.0
F 19.0
Ne 20.2
Na 23.0
Mg 24.3
Al 27.0
Si 28.1
P 31.0
S 32.1
Cl 35.5
Ar 40.0
K 39.1
Ca 40.1
Sc 45.0
Ti 47.9
V 50.9
Cr 52.0
Mn 54.9
Fe 55.9
Co 58.9
Ni 58.7
Cu 63.5
Zn 65.4
Ga 69.7
Ge 72.6
As 74.9
Se 79.0
Br 79.9
Kr 83.8
Rb 85.5
Sr 87.6
Y 88.9
Zr 91.2
Nb 92.9
Mo 95.9
Tc (99)
Ru 101
Rh 103
Pd 106
Ag 108
Cd 112
In 115
Sn 119
Sb 122
Te 128
I 127
Xe 131
Ce 133
Ba 137
La 139
Hf 179
Ta 181
W 184
Re 180
Os 194
Ir 192
Pt 195
Au 197
Hg 201
Ti 204
Pb 207
Bi 209
Po (210)
At (210)
Rn (222)
Fr (223)
Ra (226)
Ac (227)
Th 232
Pa (231)
U 238

Das periodische System der Elemente.

Gruppen	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Reihen	(RX_7) R_2O	(RX_6) R_2O_3	(RX_5) R_2O_5	RH_4 RO_2	RH_3 R_2O_5	RH_2 RO_3	RH R_2O_7	(R_2H) (R_2O_3) } Verbindungsformen
1.	1 Li							
2.	Li 7	Be 9	B 11	C 12	N 14	O 16	F 19	
3.	23 Na	24 Mg	27 Al	28 Si	31 P	32 S	35.5 Cl	
4.	K 39	Ca 40	Sc 44	Ti 48	V 51	Cr 52	Mn 55	Fe 56, Co 59, Ni 59, Cu 63
5.	(63 Cu)	65 Zn	69 Ga	72 ?	75 As	78 Se	80 Br	
6.	Rb 85	Sr 87	Y 89	Zr 90	Nb 94	Mo 96	? 100	Ru 104, Rh 104, Pd 106, Ag 108
7.	(108 Ag)	112 Cd	114 In	118 Sn	120 Sb	126 Te	127 J	
8.	Cs 133	Ba 137	La 139	Ce 141.6	Di 146.7	Tb 148.8 ?	Sm 150 ?	? 152, ? 153, ? 154, ? 156
9.	156 ?	158 ?	? 159 Ya?	162 ?	166 Er?	167 ?	? 169 Tm?	
10.	? 170	? 172	Yb 178	? 177	Ta 182	W 184	? 190	Os 193 [1]), Jr 193, Pt 195, Au 197
11.	(197 Au)	200 Hg	204 Tl	207 Pb	210 Bi	? 214 Ng?	219 ?	
12.	? 221	? 225	? 230	Th 234	? 237	U 240	? 244	

[1]) Aus der Dampfdichte des OsO_4 (Deville und Debray, Ann. chim. phys. (3) 56, 476) ergiebt sich die Zahl 193 als Atomgewicht des Osmiums.

Периодическая система алкогольных элементов

%	I	II	III	IV	V	VI	VII	VIII		
1	H *							He 16 56 ХЕРЕС		
2	Li 21 210 ЛИКЕР	B 38 8 БРЕНДИ	K 41 0,41 КОНЬЯК	V 40 485 ВОДКА	W 100 990 ЦАРСКАЯ ВОДКА	Gr 6 39 ГРОГ	Sh 10 10 ШАМПАНСКОЕ	Pt 18 600 ПОРТВЕЙН		
3	Md 56 956 МЕДОВУХА	Sc 60 0 САКЭ	D 29 0,5 ДЖИН	Ra 39 7 РАКИЯ	Pn 45 450 ПЕРНО	Pu 7 88 ПУНШ	Bu 2 3 БУРГУНДСКОЕ	Mn 12 100 МАРТИНИ	Ve 14 7 ВЕРМУТ	Kn 13 2 КЬЯНТИ
4	Na 11,11 22,22 НАЛИВКА	Cu 40,2 333 ЦУЙКА	P 52 555 ПЕРЦОВКА	Cl 40,5 405 КЮММЕЛЬ	Kr 7,5 200 КРЮШОН	Ga 34 0,4 ГРАППА	Kb 8 22 КАБЕРНЕ	Mu 16,5 1,65 МУСКАТ	Bm 15 920 БУКЕТ МОЛДАВИИ	Tc 17 60 ТОКАЙ
5	Rm 42 98 РОМ	Go 92 880 ГОРИЛКА	Z 48 84 ЗУБРОВКА	Ka 8,8 9,9 КАЛЬВАДОС	Si 0,8 0 СИДР	Zl * * ЗЕЛЬЕ	Bd 3 0,3 БОРДО	Ca 19 72,2 КАГОР	Al 0,01 0,03 АЛИГОТЕ	Mr 20 10 МАДЕРА
6	Te 33 333 ТЕКИЛА	Ch 63 0,00 ЧАЧА	At 31 3 АБСЕНТ	El 11 111 ЭЛЬ	Cm 20,5 10000 КРОВАВАЯ МЭРИ	Tb * * * ТЕЛЕБЕНЧИК	* хрен его знает, что это (спорн.) ** шнапс бабы Дзыны *** коктейль по-русски		Kl 5 45 ** ПИВО KELLERS	- крепость 1 - калории
7	Pi 37 101 ПУЛЬКЕ	Ov * * * * ОГНЕННАЯ ВОДА	Du 22 902 ДУХИ	Sn 43 66 САМОГОН	Pr 73 666 ПЕРВАЧ	Er 29 998 ЕРШ	**** виски по-индейски ***** сладкий, когда пьешь задарма ****** от крепости даже челюсти сводит			1- для таблицы ОПОХМЕЛОИДОВ и ЗАКУСОИДОВ - значение, указывающее эффективность данного элемента
8	Bz 36 0,06 БАЛЬЗАМ	S 95 0,95 СПИРТ	Ts 96,6 966 ТЕХ. СПИРТ	Dn 77 834 ДЕНАТУРАТ	O 26 16 ОДЕКОЛОН	L 25 15 ЛОСЬЕН	U * * * УКСУС	Br 0,1 985 БРАГА	Bt 0,09 0,1 БОРМОТУХА	Fu 0 0 ПОЙЛО

ЗАКУСОИДЫ

Sr 1,1 34 СЫРОК	Mi 0,7 18 МИТИТЕИ	Tr 2,2 740 ТАРАНЬКА	Ir 0,03 0,03 ИРИСКА	Bl 0 800 БЕЛЯШ	Mn 12 0 МАМАЛЫГА	Pn 1,5 0,0002 ЖЕВ. РЕЗИНКА	Hr 16 340 ХРЕН	Re 16 340 РЕДЬКА	Dr 1 1 ДУНЬКИНА РАДОСТЬ	Pd 4,4 220 ПОДОСИНОВИК	Ge 7,3 910 ГЕМАТОГЕН	Ar 0,99 0,99 АРБУЗ	Sm 2,4 242 СЕМЕЧКИ	Cs 4,8 484 КАЗИНАКИ	Pm 1 999 ПЕЛЬМЕНИ

ОПОХМЕЛОИДЫ

Kf 3 13 КЕФИР	Rs 2,9 92 РАССОЛ	Ti 0,75 35 ЧАЙ	Ti * * * ЧЕФИРЬ	Kv 35 103 КВАС	Bo 1,6 160 БОРЩ	Ha 40 400 ХАРЧО	Ml 0,08 47 МОЛОКО	Ku 8,8 939 КУМЫС	Gb 0 0 ГАЛИНА БЛАНКА	Cf 2,8 315 КОФЕ	Rh 4 819 РЯЖЕНКА	Ma 5,6 9 МАРИНАД	Vi 5,6 9 ВАЛЕРИАНКА	Au 0,00 0,00 АСПИРИН УПСА	Kc 2,22 2,22 КАПЕЛЬНИЦА

Tabla periódica

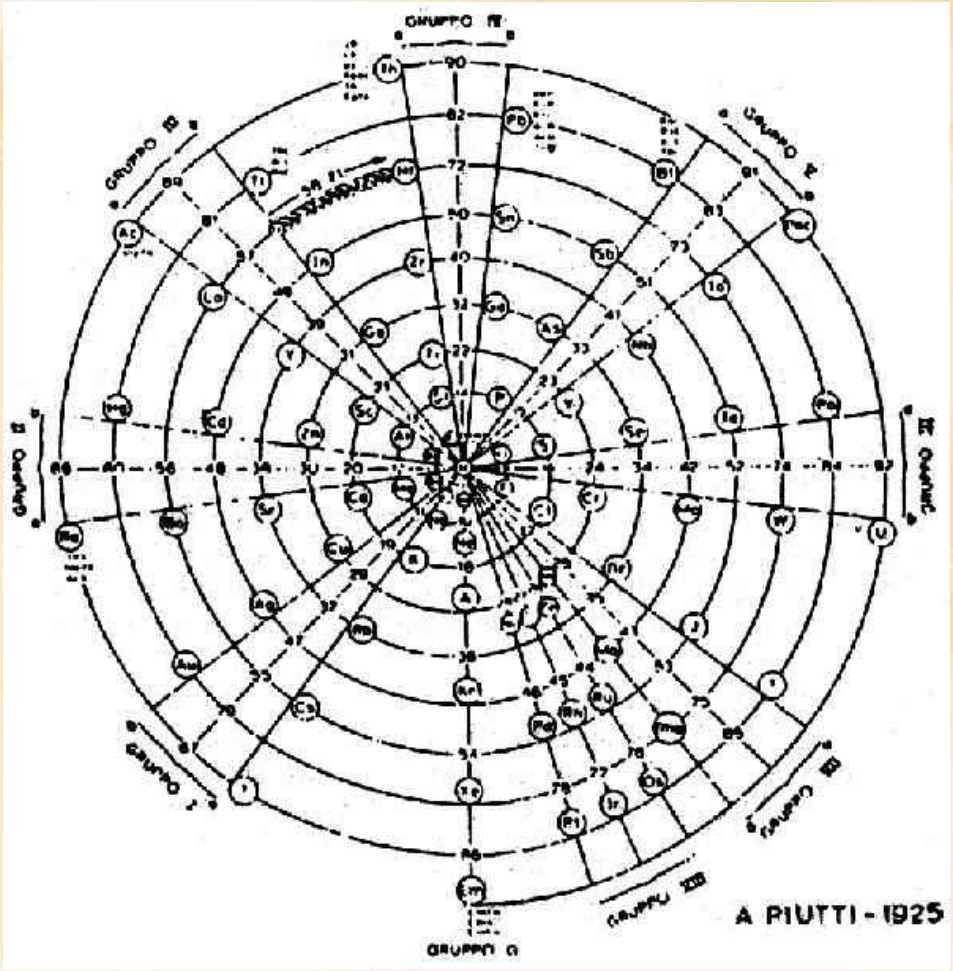
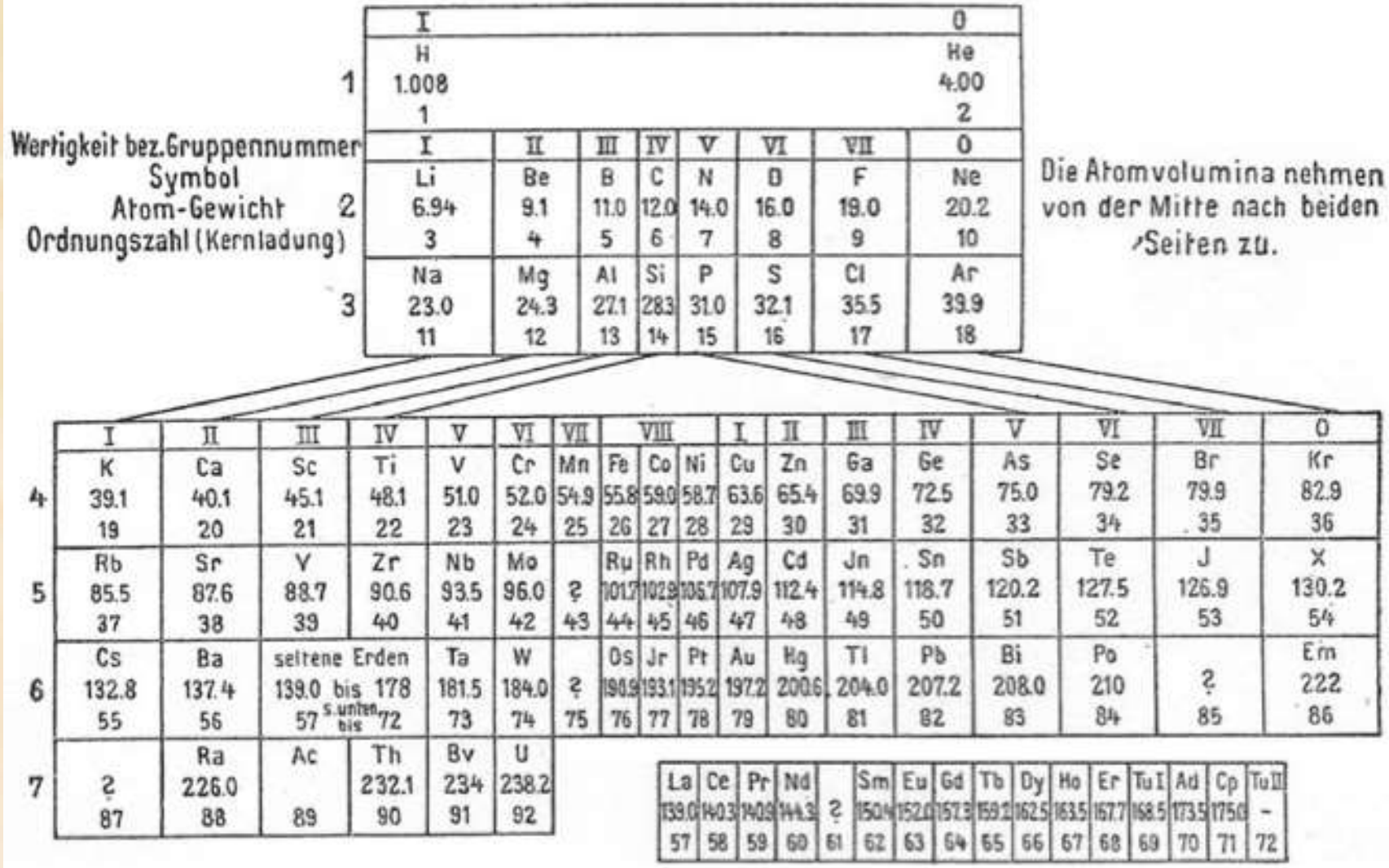
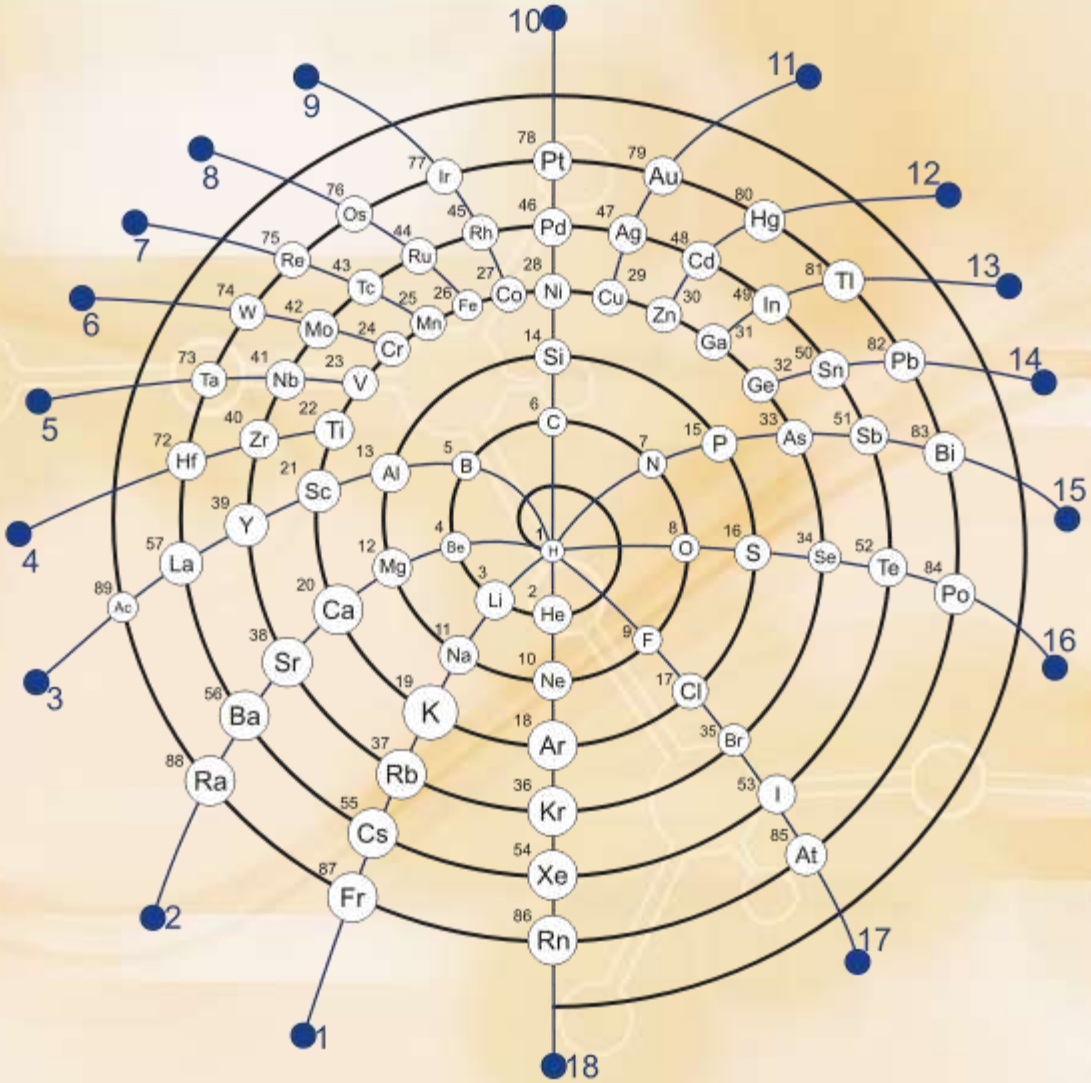


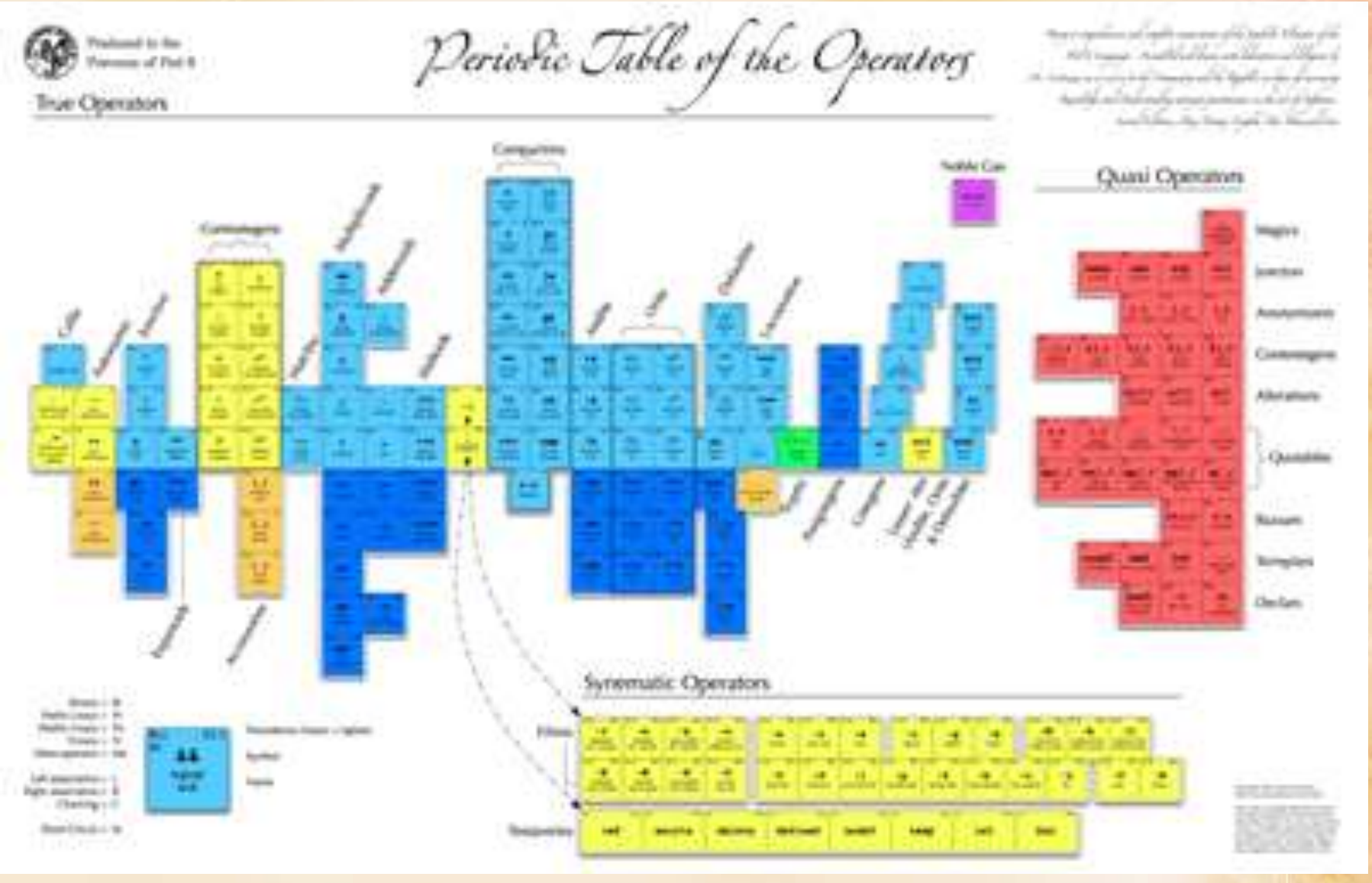
Tabelle I.

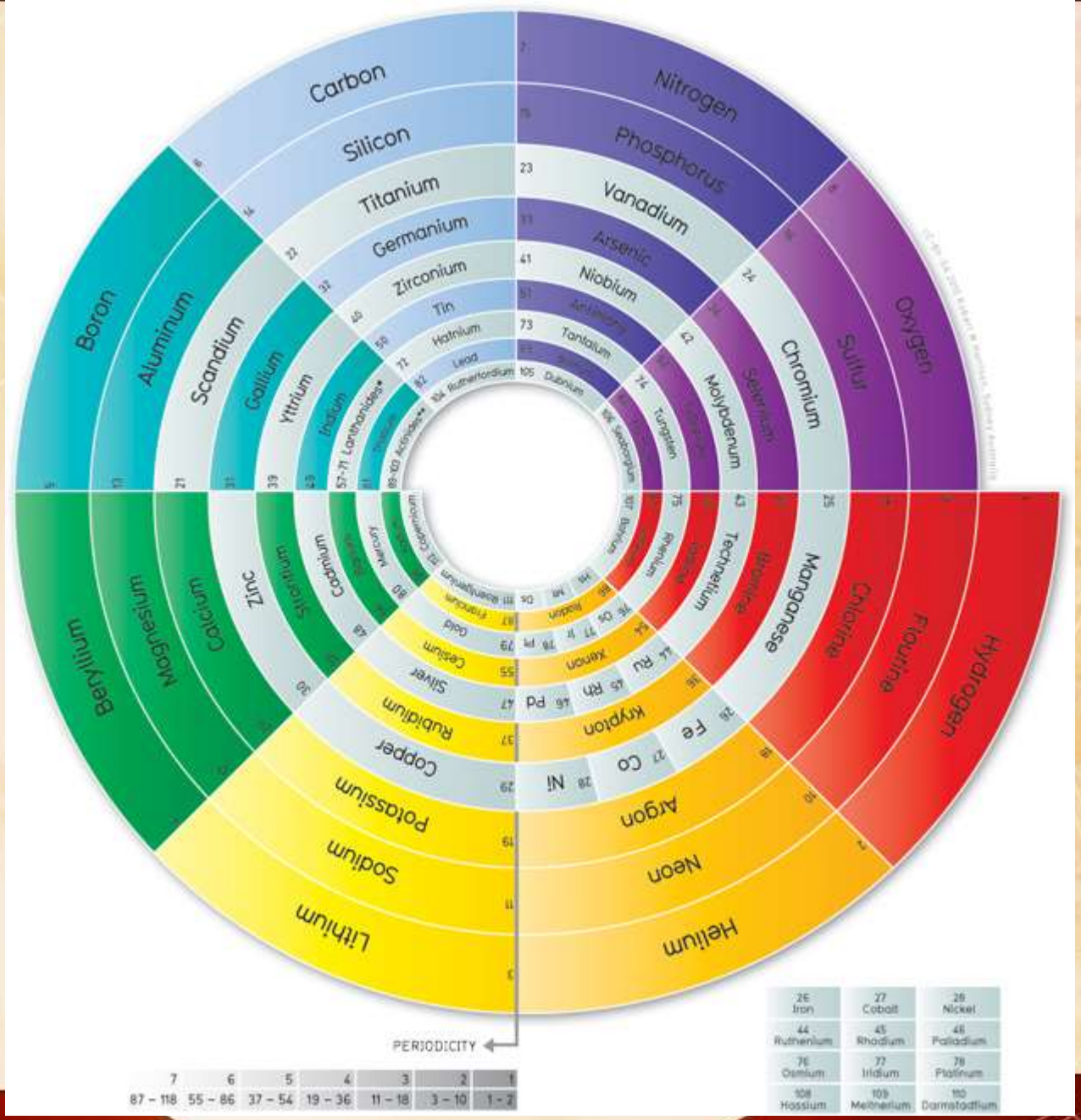
Periodisches System der Elemente.

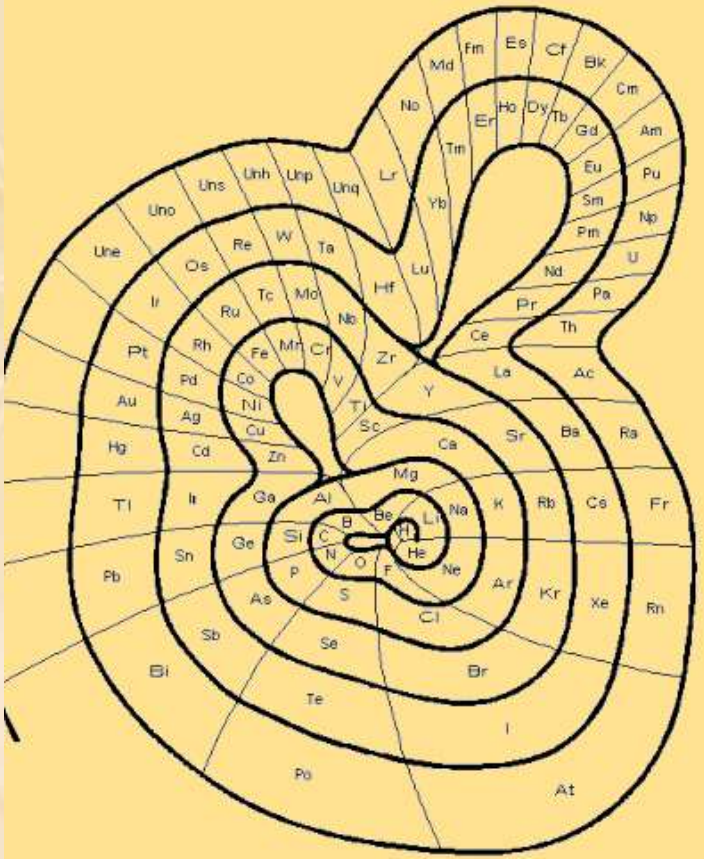




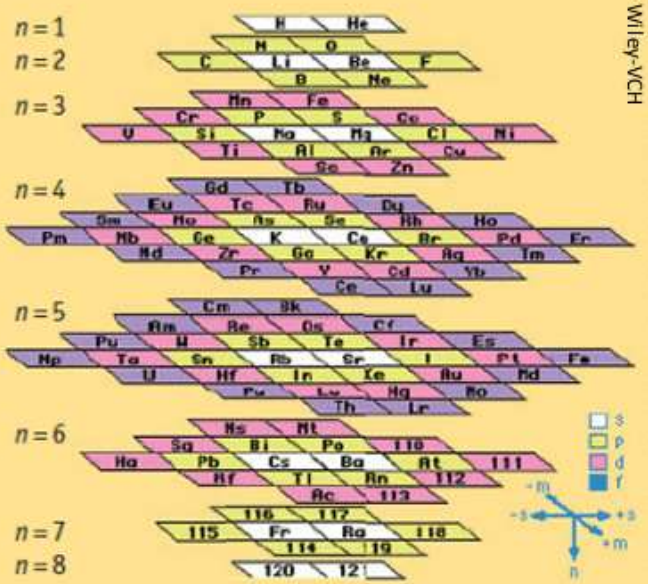
Periodic table: Spiral format by Jan Scholten


Periodic Table of the Operators
True Operators
Quasi Operators
Syntematic Operators

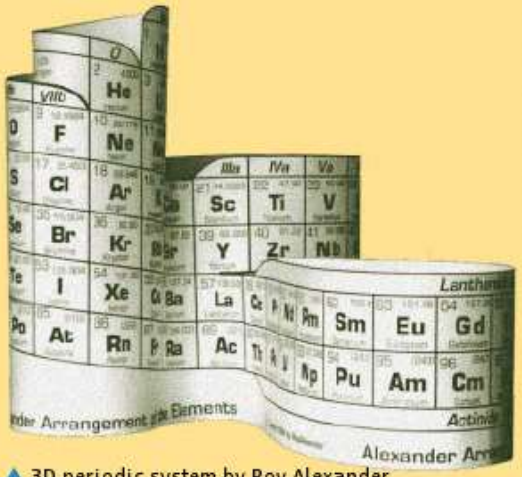

Carbon
Silicon
Titanium
Germanium
Zirconium
Tin
Hafnium
Lead
Rutherfordium
Nitrogen
Phosphorus
Vanadium
Arsenic
Niobium
Antimony
Tantalum
Bismuth
Dubnium
Boron
Aluminum
Scandium
Gallium
Yttrium
Indium
57-71 Lanthanides*
89-103 Actinides**
Thallium
Tungsten
Seaborgium
Oxygen
Sulfur
Selenium
Molybdenum
Chromium
Technetium
Manganese
Bromine
Chlorine
Fluorine
Hydrogen
Helium
Neon
Argon
Krypton
Xenon
Radon
Bohrium
Hassium
Meitnerium
Darmstadtium
Roentgenium
Copernicium
Nihonium
Flerovium
Moscovium
Livermorium
Tennessine
Oganesson
Zinc
Gallium
Germanium
Arsenic
Selenium
Bromine
Krypton
Cadmium
Indium
Tin
Antimony
Tellurium
Iodine
Xenon
Mercury
Thallium
Lead
Bismuth
Polonium
Astatine
Radon
Beryllium
Magnesium
Calcium
Copper
Rubidium
Silver
Cesium
Gold
Francium
Scandium
Titanium
Vanadium
Chromium
Manganese
Iron
Cobalt
Nickel
Copper
Zinc
Lithium
Sodium
Potassium
Rubidium
Cesium
Francium
Yttrium
Zirconium
Niobium
Molybdenum
Technetium
Ruthenium
Rhodium
Palladium
Silver
Cadmium
Lanthanum
Hafnium
Tantalum
Tungsten
Rhenium
Osmium
Iridium
Platinum
Gold
Mercury
Actinium
Rutherfordium
Dubnium
Seaborgium
Bohrium
Hassium
Meitnerium
Darmstadtium
Roentgenium
Copernicium
Nihonium
Flerovium
Moscovium
Livermorium
Tennessine
Oganesson
PERIODICITY
7 6 5 4 3 2 1
87 – 118 55 – 86 37 – 54 19 – 36 11 – 18 3 – 10 1 – 2
26 Iron
27 Cobalt
28 Nickel
44 Ruthenium
45 Rhodium
46 Palladium
76 Osmium
77 Iridium
78 Platinum
108 Hassium
109 Meitnerium
110 Darmstadtium



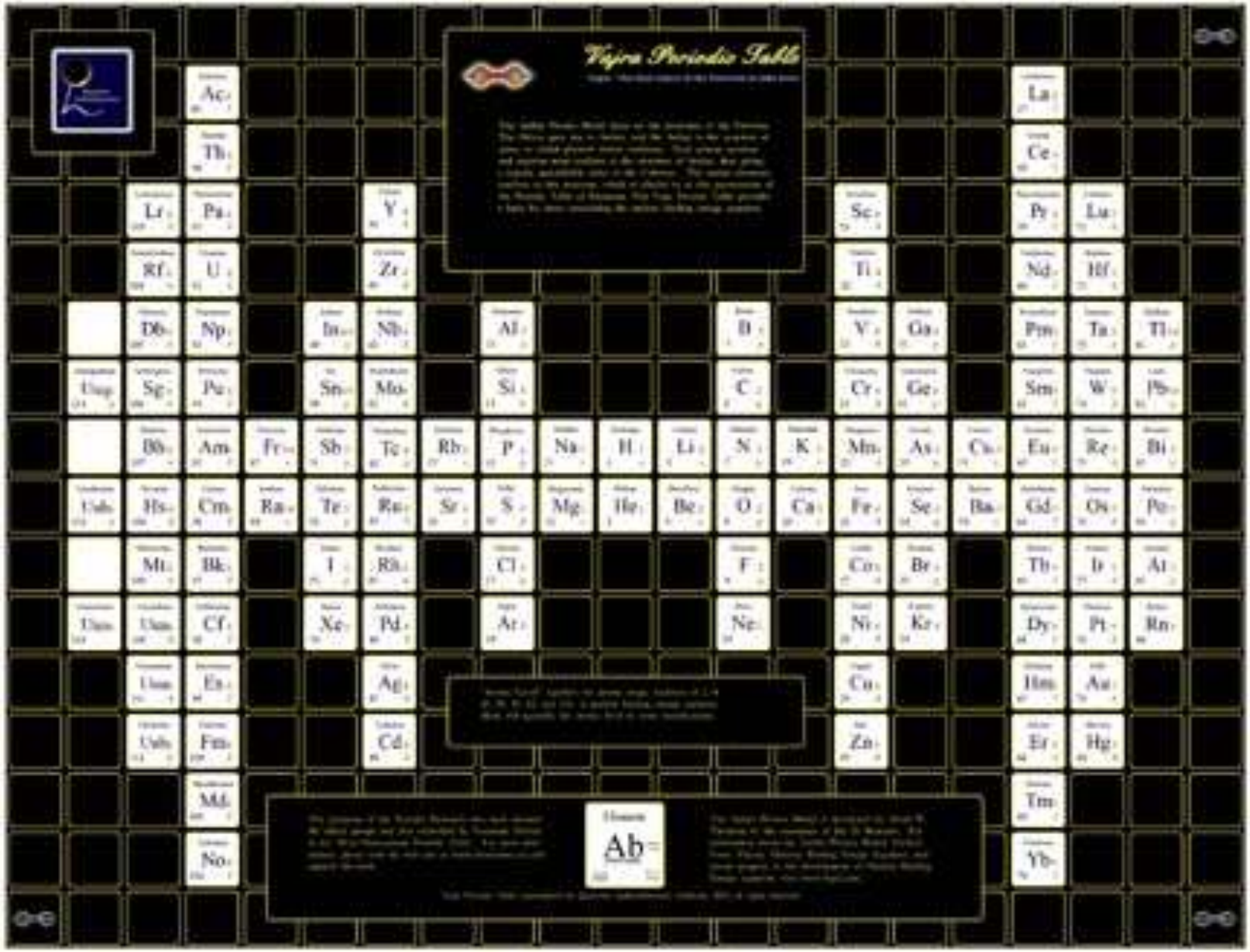
▲ Fractal periodic system by Melinda Green
(c) Melinda Green



▲ Stepped periodic system by Timmothy Stowe



▲ 3D periodic system by Roy Alexander


Vajra Periodic Table

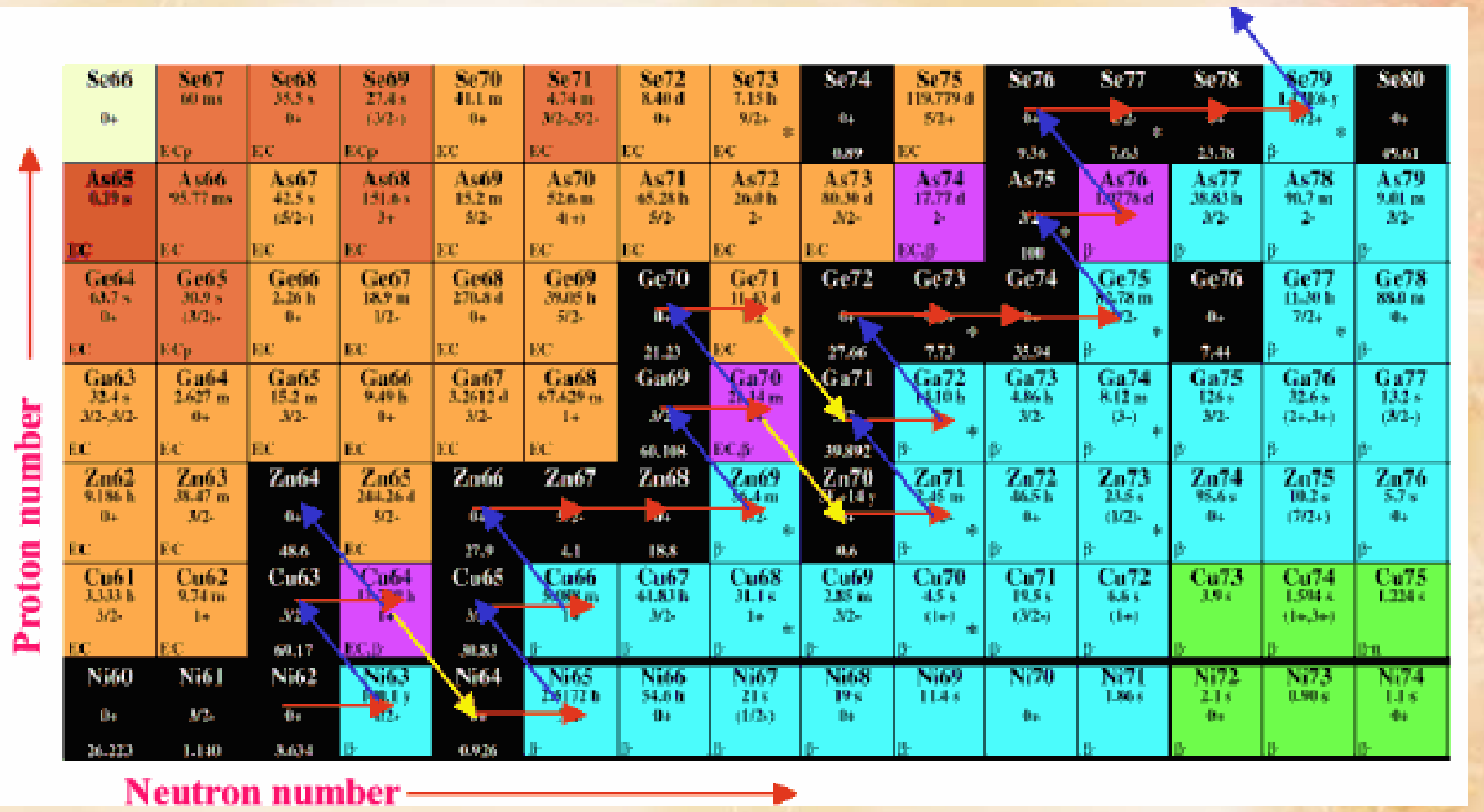
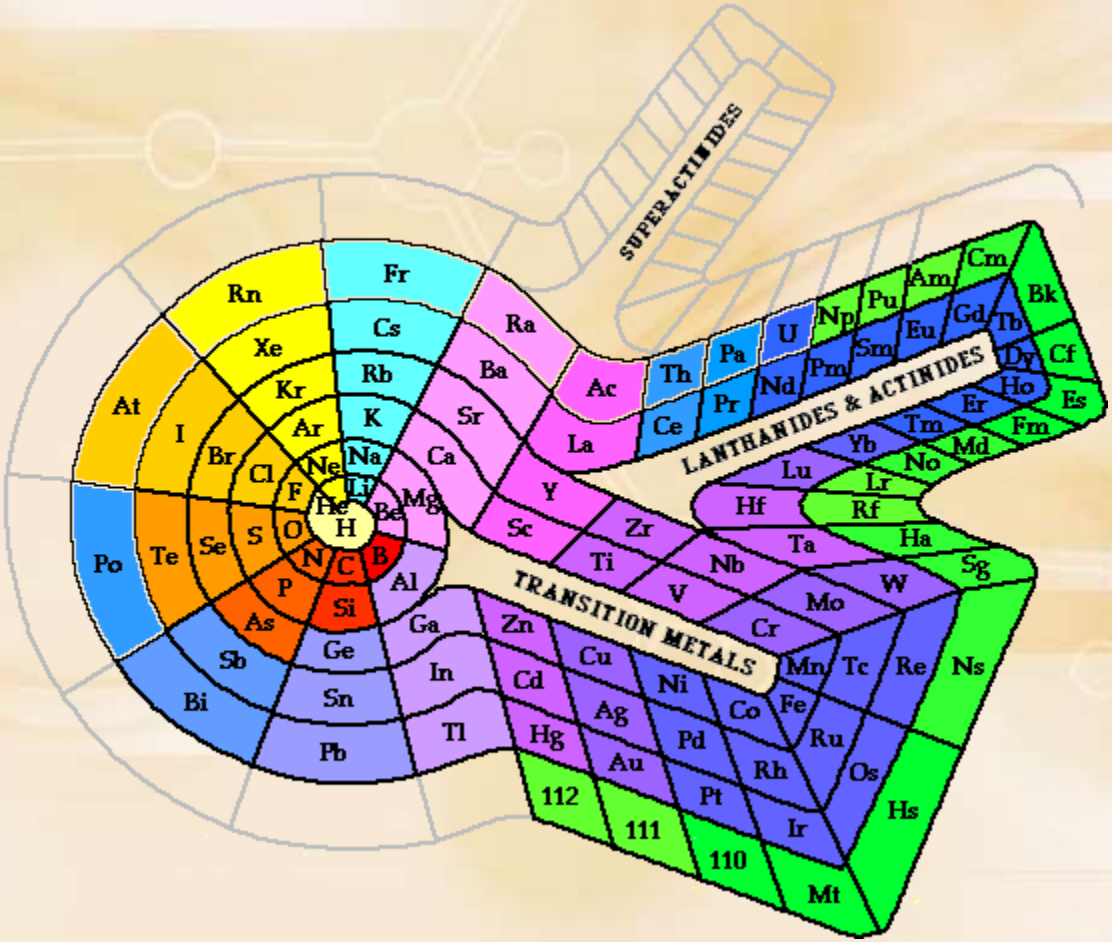

Proton number
Neutron number

Tabla periódica



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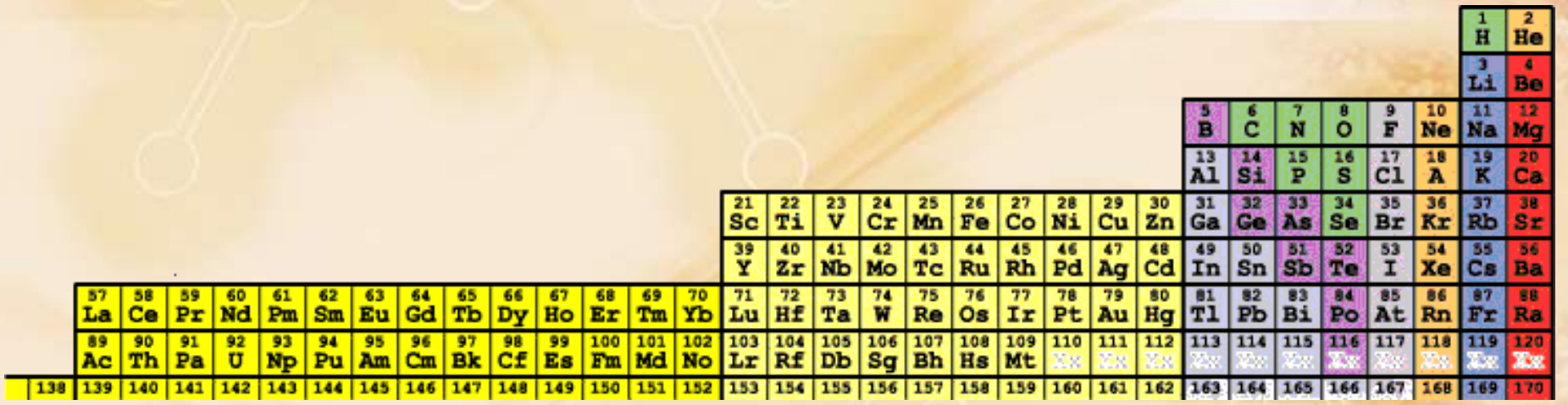

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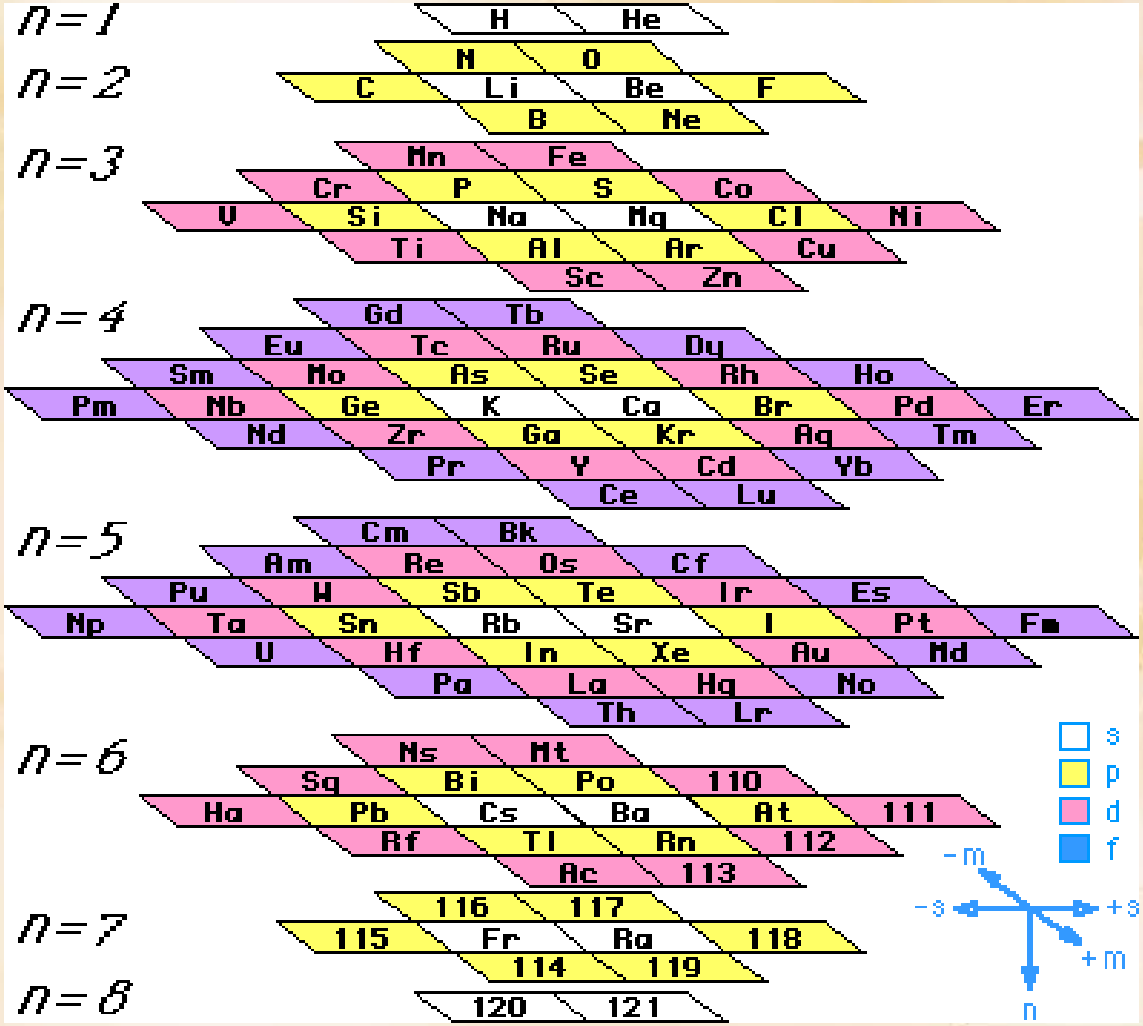

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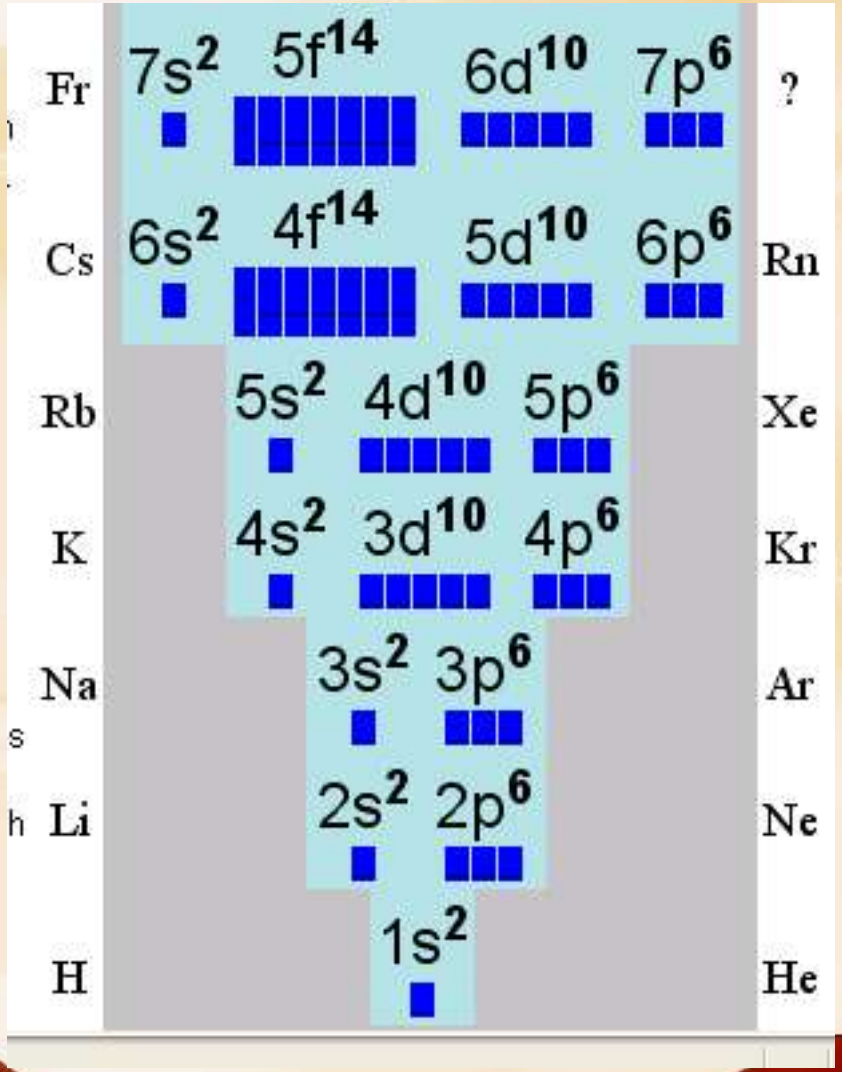

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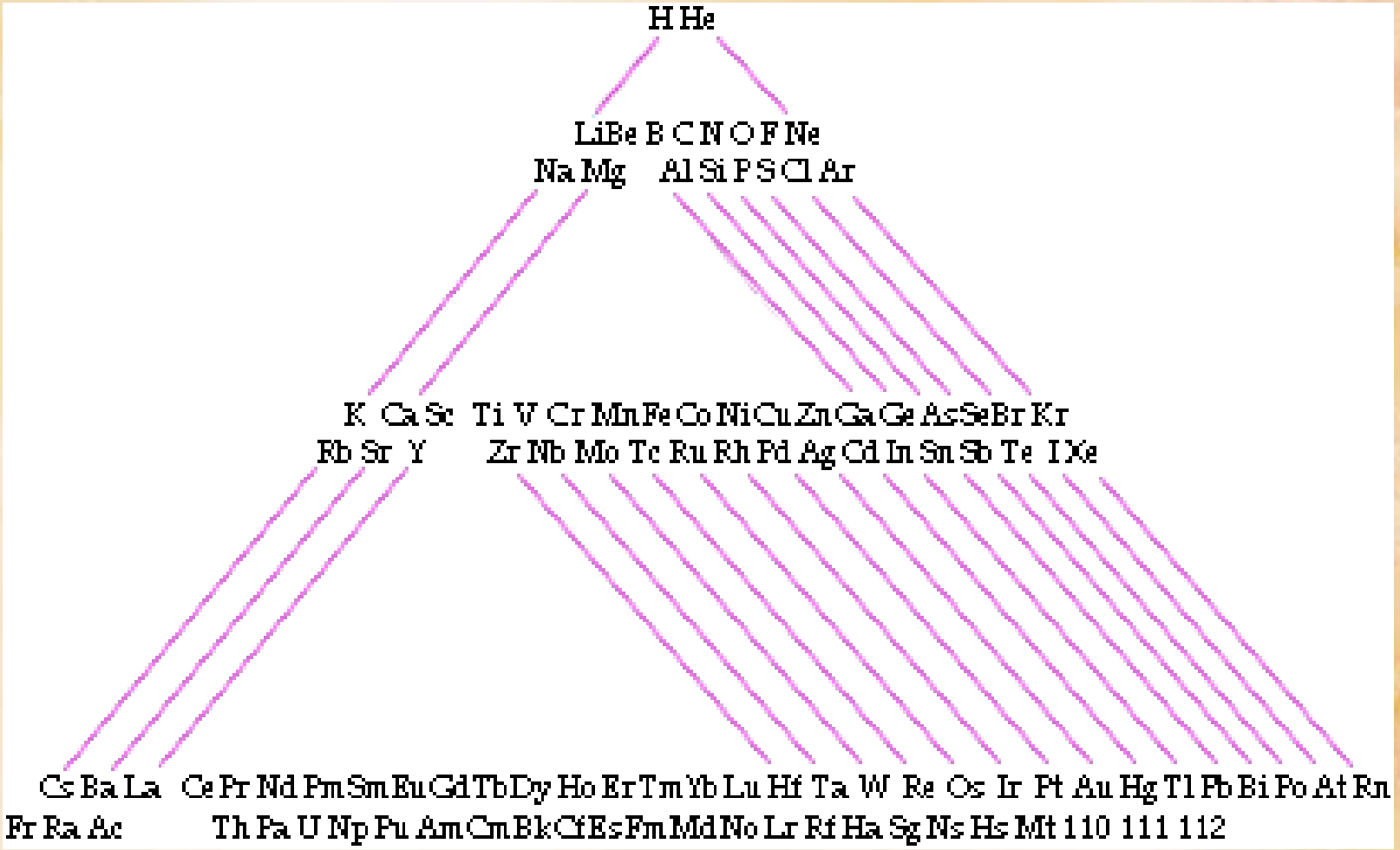

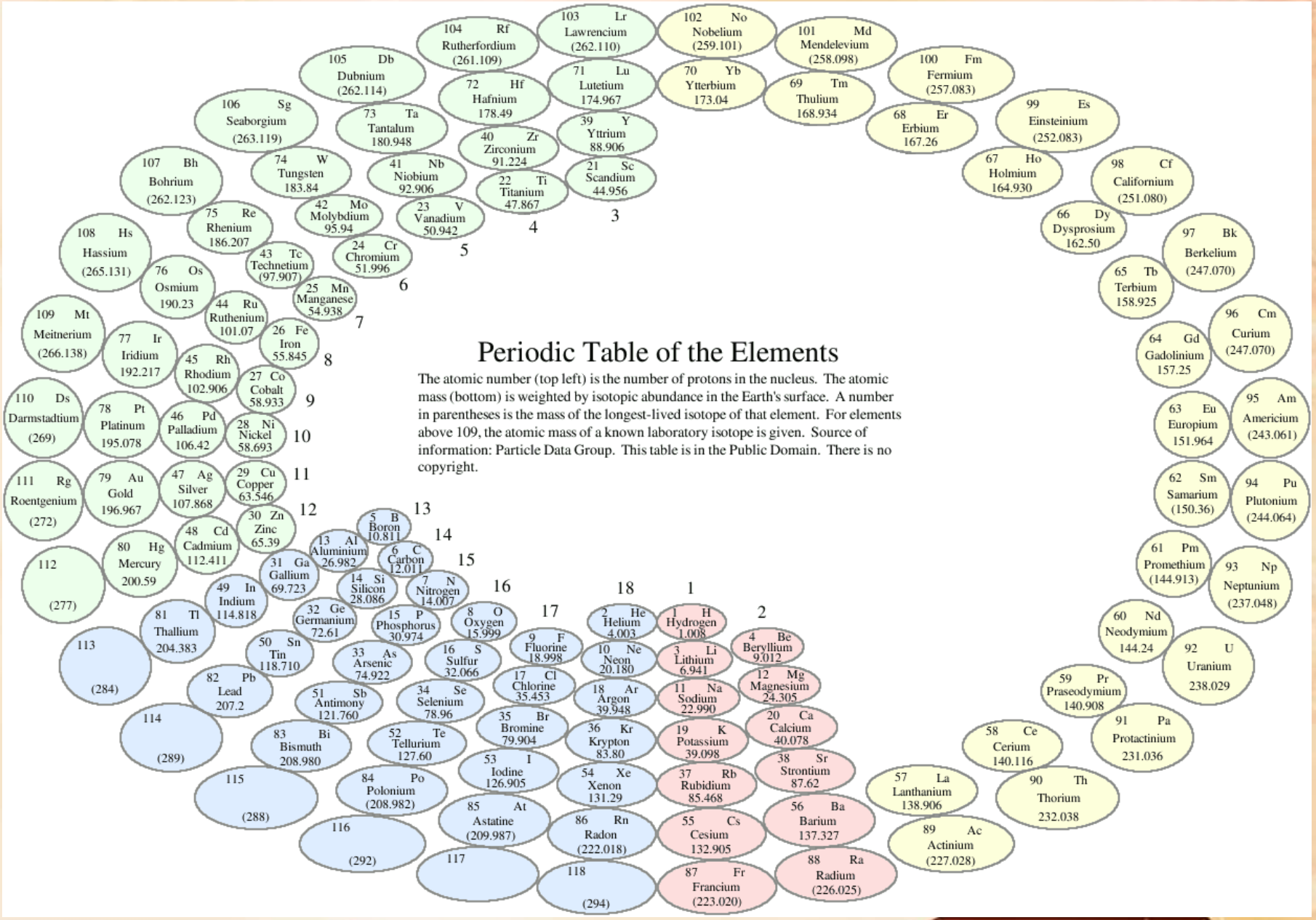
Periodic Table of the Elements
The atomic number (top left) is the number of protons in the nucleus. The atomic mass (bottom) is weighted by isotopic abundance in the Earth's surface. A number in parentheses is the mass of the longest-lived isotope of that element. For elements above 109, the atomic mass of a known laboratory isotope is given. Source of information: Particle Data Group. This table is in the Public Domain. There is no copyright.
1 H Hydrogen 1.008
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
13 Al Aluminium 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 47.867
23 V Vanadium 50.942
24 Cr Chromium 51.996
25 Mn Manganese 54.938
26 Fe Iron 55.845
27 Co Cobalt 58.933
28 Ni Nickel 58.693
29 Cu Copper 63.546
30 Zn Zinc 65.39
31 Ga Gallium 69.723
32 Ge Germanium 72.61
33 As Arsenic 74.922
34 Se Selenium 78.96
35 Br Bromine 79.904
36 Kr Krypton 83.80
37 Rb Rubidium 85.468
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 (97.907)
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 118.710
51 Sb Antimony 121.760
52 Te Tellurium 127.60
53 I Iodine 126.905
54 Xe Xenon 131.29
55 Cs Cesium 132.905
56 Ba Barium 137.327
57 La Lanthanium 138.906
58 Ce Cerium 140.116
59 Pr Praseodymium 140.908
60 Nd Neodymium 144.24
61 Pm Promethium (144.913)
62 Sm Samarium (150.36)
63 Eu Europium 151.964
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
72 Hf Hafnium 178.49
73 Ta Tantalum 180.948
74 W Tungsten 183.84
75 Re Rhenium 186.207
76 Os Osmium 190.23
77 Ir Iridium 192.217
78 Pt Platinum 195.078
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 (208.982)
85 At Astatine (209.987)
86 Rn Radon (222.018)
87 Fr Francium (223.020)
88 Ra Radium (226.025)
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 (252.083)
100 Fm Fermium (257.083)
101 Md Mendelevium (258.098)
102 No Nobelium (259.101)
103 Lr Lawrencium (262.110)
104 Rf Rutherfordium (261.109)
105 Db Dubnium (262.114)
106 Sg Seaborgium (263.119)
107 Bh Bohrium (262.123)
108 Hs Hassium (265.131)
109 Mt Meitnerium (266.138)
110 Ds Darmstadtium (269)
111 Rg Roentgenium (272)
112 (277)
113 (284)
114 (289)
115 (288)
116 (292)
117
118 (294)
1
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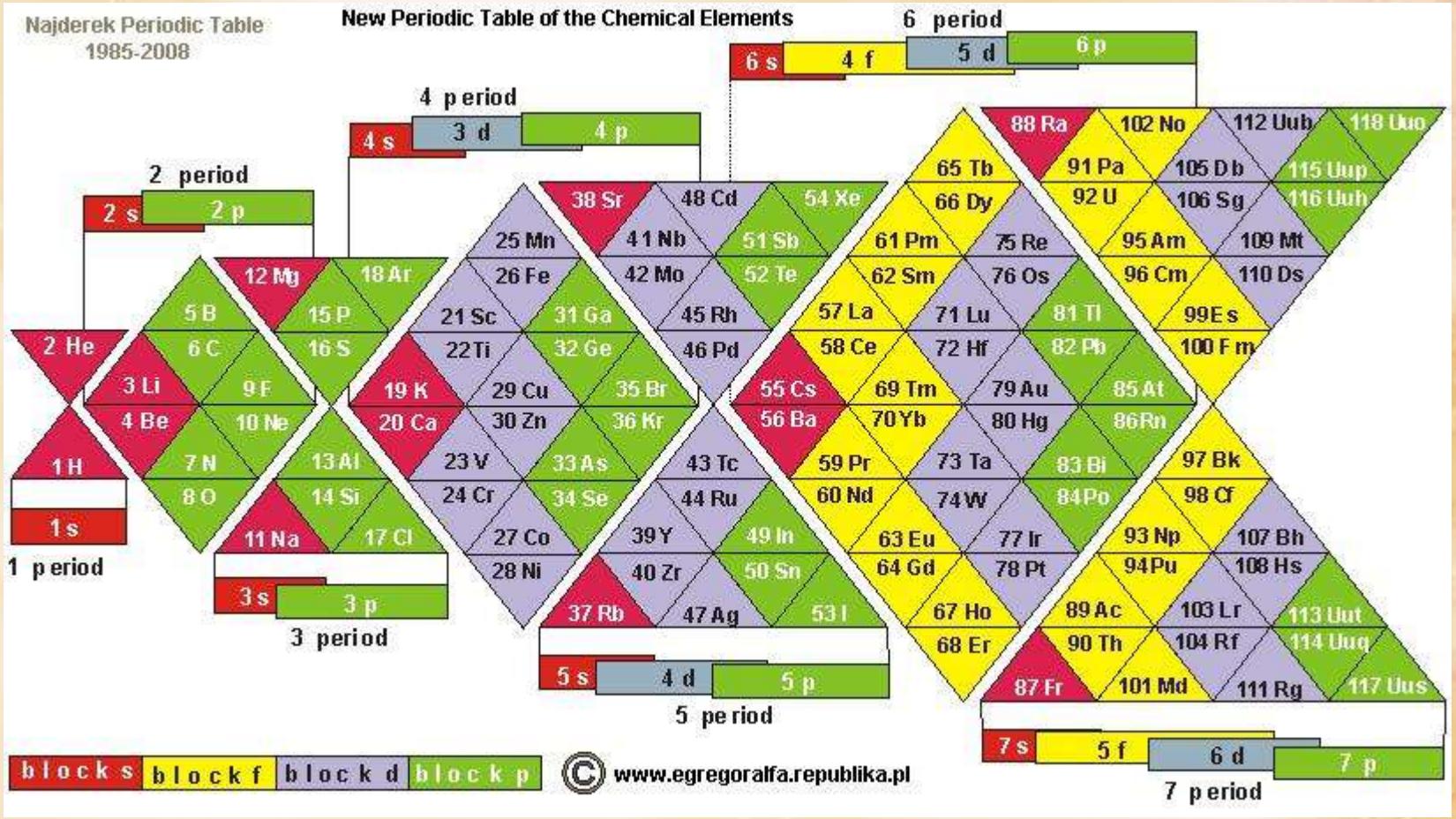
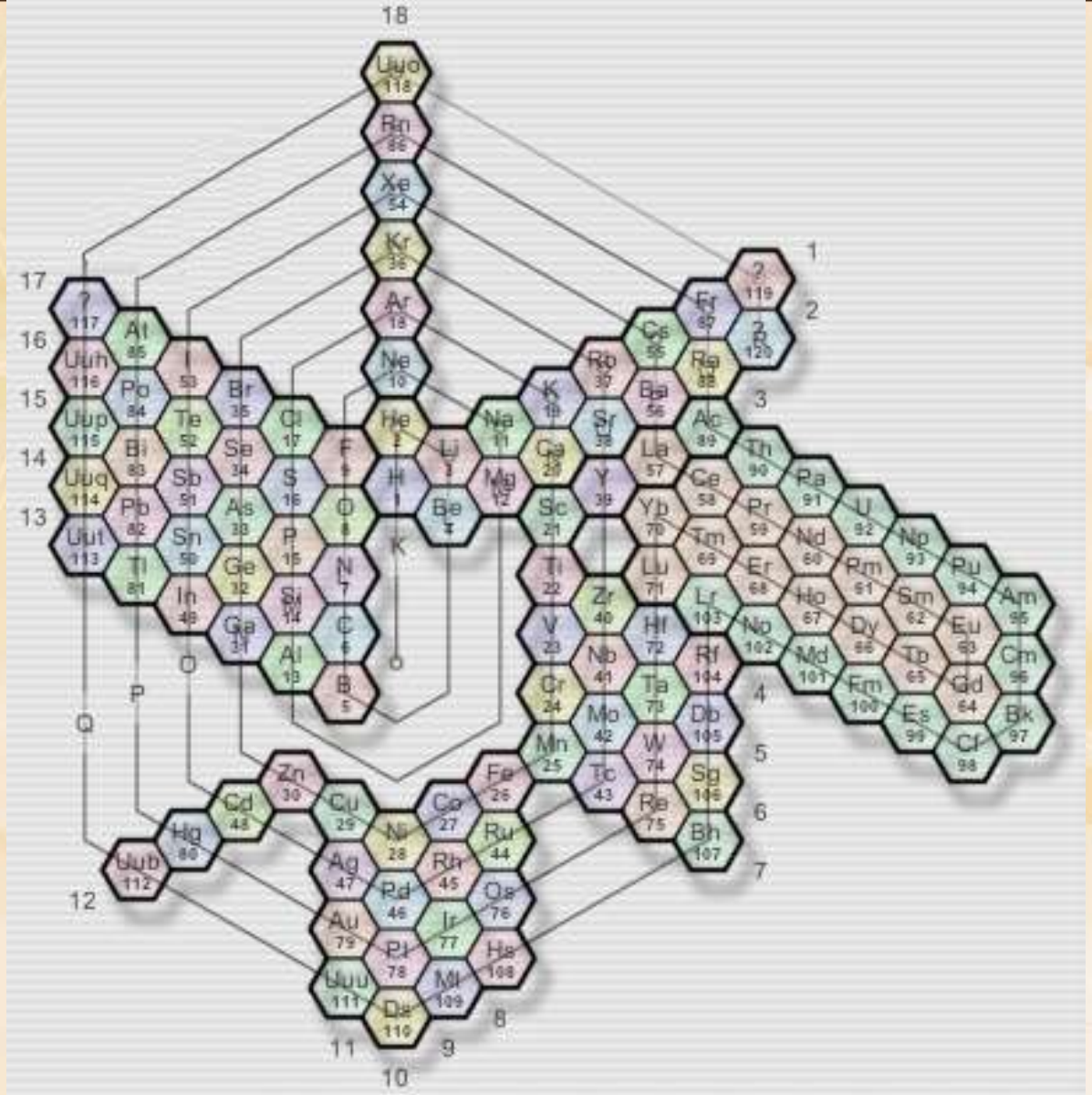
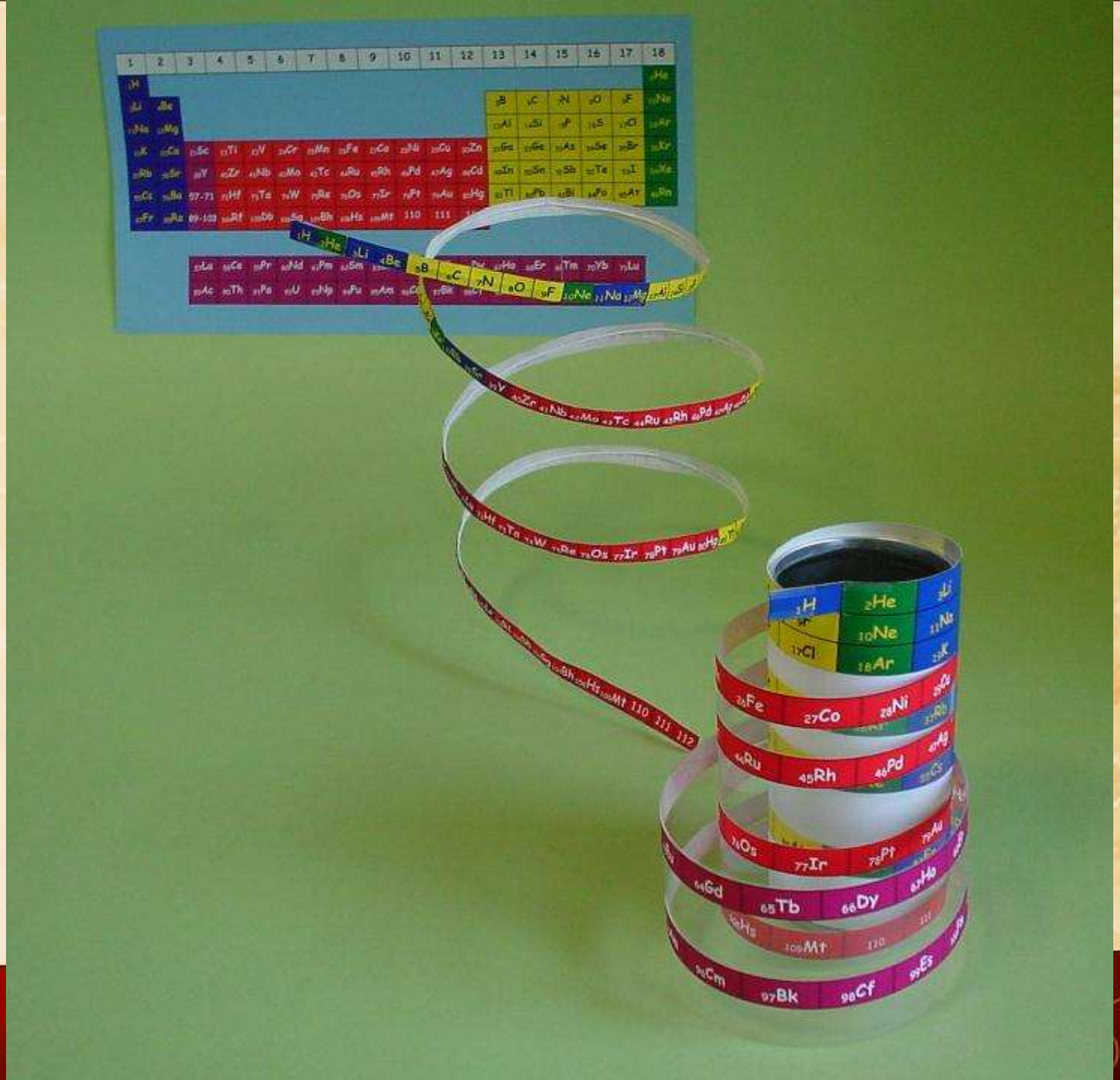
18


Najderek Periodic Table
1985-2008
New Periodic Table of the Chemical Elements
6 period
6 s
4 f
5 d
6 p
4 period
4 s
3 d
4 p
2 period
2 s
2 p
1 period
1 s
3 period
3 s
3 p
5 period
5 s
4 d
5 p
7 period
7 s
5 f
6 d
7 p
1 H
2 He
3 Li
4 Be
5 B
6 C
7 N
8 O
9 F
10 Ne
11 Na
12 Mg
13 Al
14 Si
15 P
16 S
17 Cl
18 Ar
19 K
20 Ca
21 Sc
22 Ti
23 V
24 Cr
25 Mn
26 Fe
27 Co
28 Ni
29 Cu
30 Zn
31 Ga
32 Ge
33 As
34 Se
35 Br
36 Kr
37 Rb
38 Sr
39 Y
40 Zr
41 Nb
42 Mo
43 Tc
44 Ru
45 Rh
46 Pd
47 Ag
48 Cd
49 In
50 Sn
51 Sb
52 Te
53 I
54 Xe
55 Cs
56 Ba
57 La
58 Ce
59 Pr
60 Nd
61 Pm
62 Sm
63 Eu
64 Gd
65 Tb
66 Dy
67 Ho
68 Er
69 Tm
70 Yb
71 Lu
72 Hf
73 Ta
74 W
75 Re
76 Os
77 Ir
78 Pt
79 Au
80 Hg
81 Tl
82 Pb
83 Bi
84 Po
85 At
86 Rn
87 Fr
88 Ra
89 Ac
90 Th
91 Pa
92 U
93 Np
94 Pu
95 Am
96 Cm
97 Bk
98 Cf
99 Es
100 Fm
101 Md
102 No
103 Lr
104 Rf
105 Db
106 Sg
107 Bh
108 Hs
109 Mt
110 Ds
111 Rg
112 Uub
113 Uut
114 Uuq
115 Uup
116 Uuh
117 Uus
118 Uuo
blocks
block f
block d
block p
© www.egregoralfa.republika.pl

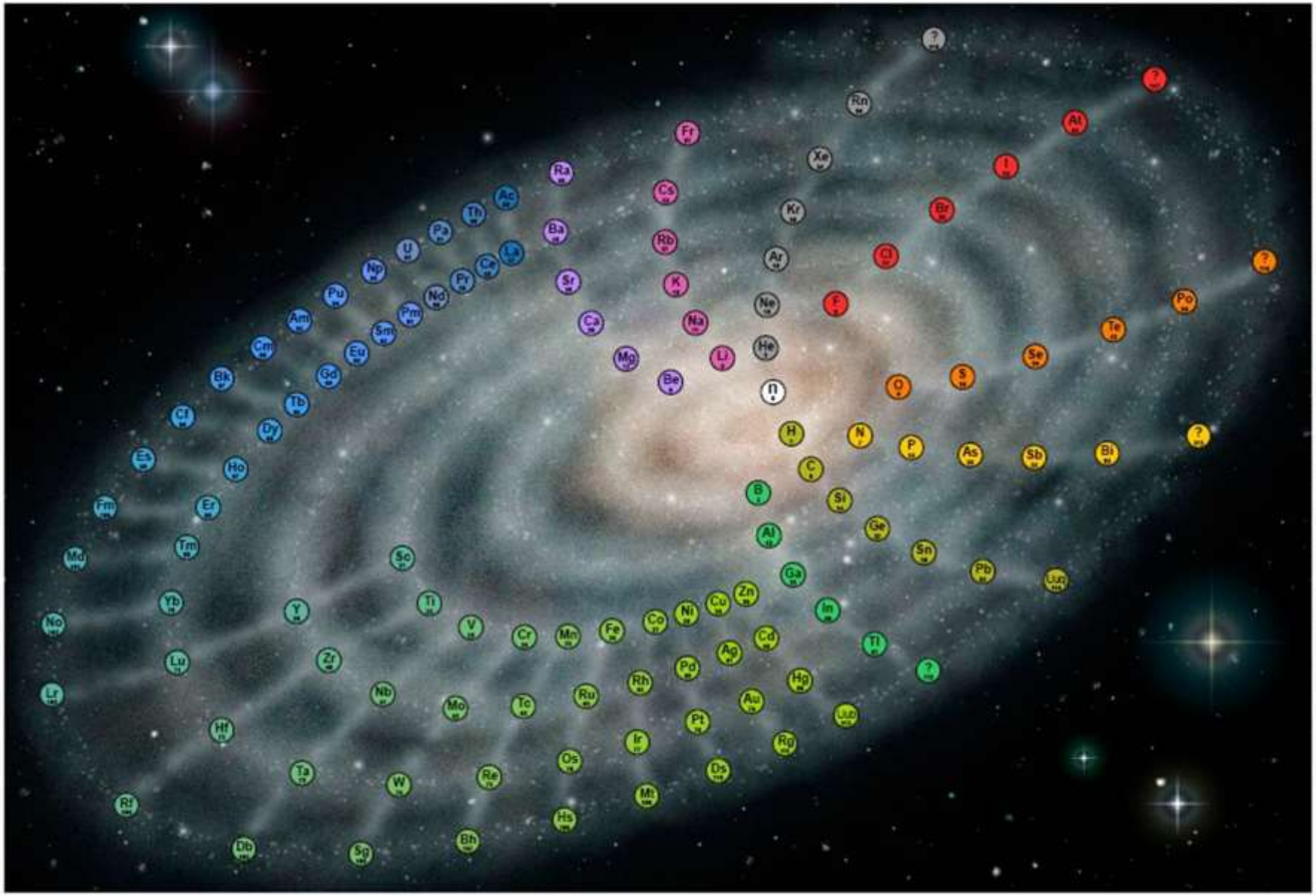

18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Q
P
O
K


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1H 2He
3Li 4Be 5B 6C 7N 8O 9F 10Ne
11Na 12Mg 13Al 14Si 15P 16S 17Cl 18Ar
19K 20Ca 21Sc 22Ti 23V 24Cr 25Mn 26Fe 27Co 28Ni 29Cu 30Zn 31Ga 32Ge 33As 34Se 35Br 36Kr
37Rb 38Sr 39Y 40Zr 41Nb 42Mo 43Tc 44Ru 45Rh 46Pd 47Ag 48Cd 49In 50Sn 51Sb 52Te 53I 54Xe
55Cs 56Ba 57-71 72Hf 73Ta 74W 75Re 76Os 77Ir 78Pt 79Au 80Hg 81Tl 82Pb 83Bi 84Po 85At 86Rn
87Fr 88Ra 89-103 104Rf 105Db 106Sg 107Bh 108Hs 109Mt 110 111 112
57La 58Ce 59Pr 60Nd 61Pm 62Sm 63Eu 64Gd 65Tb 66Dy 67Ho 68Er 69Tm 70Yb 71Lu
89Ac 90Th 91Pa 92U 93Np 94Pu 95Am 96Cm 97Bk 98Cf 99Es


H
Li
Na
K
Rb
Cs
Fr
Be
Mg
Ca
Sr
Ba
Ra
Sc
Ti
V
Cr
Y
Zr
Nb
Mo
La
W
Eu
Gd
Tb
Am
Cm
Bk

CHEMICAL GALAXY

A NEW VISION OF THE PERIODIC TABLE OF THE ELEMENTS




H
Li
Na
K
Rb
Cs
Fr
Be
Mg
Ca
Sr
Ba
Ra
Sc
Y
Lu
Lr
Ti
Zr
Hf
Rf
V
Nb
Ta
Db
Cr
Mo
W
Sg
Mn
Tc
Re
Bh
Fe
Ru
Os
Hs
Co
Rh
Ir
Mt
Ni
Pd
Pt
Ds
Cu
Ag
Au
Rg
Zn
Cd
Hg
Uub
B
Al
Ga
In
Ti
Uut
C
N
O
Si
P
S
Ge
As
Se
Sn
Sb
Te
Pb
Bi
Po
Uuq
Uup
Uuh
F
Cl
Br
I
At
Uus
He
Ne
Ar
Kr
Xe
Rn
Uuo

art. lebedev

Periodic Table of the Elements, in Pictures

Periods 1–7 ↓ | Group 1 | Group 2 Alkali Earth Metals | Group 3 Boron Group | Group 4 Carbon Group | Group 5 Nitrogen Group | Group 6 Oxygen Group | Group 7 Halogens | Group 8 Inert Gases

Period	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8
1	H 1 Hydrogen — Sun & Stars; Water							He 2 Helium — Balloons
2	Li 3 Lithium — Watch Batteries	Be 4 Beryllium — Emeralds	B 5 Boron — Heat-Resistant Glassware	C 6 Carbon — Plants and Animals	N 7 Nitrogen — Air	O 8 Oxygen — Air; Water	F 9 Fluorine — Toothpaste	Ne 10 Neon — OPEN; Signs
3	Na 11 Sodium — Baking Soda	Mg 12 Magnesium — Green Plants	Al 13 Aluminum — Foil	Si 14 Silicon — Rocks, Sand, & Dirt	P 15 Phosphorus — Bones	S 16 Sulphur — Egg Yolks	Cl 17 Chlorine — Bleach	Ar 18 Argon — Light Bulbs
4	K 19 Potassium — Fertilizer	Ca 20 Calcium — Teeth	Sc 21 Scandium — Aquamarines	Ti 22 Titanium — Jets	V 23 Vanadium — Springs	Cr 24 Chromium — Car Trim	Mn 25 Manganese — Rock Crushers	Fe 26 Iron — Buildings
	Co 27 Cobalt — Magnets	Ni 28 Nickel — Coins	Cu 29 Copper — Electric Wires	Zn 30 Zinc — Brass	Ga 31 Gallium — Light-Emitting Diodes	Ge 32 Germanium — Electronics	As 33 Arsenic — Poison	Se 34 Selenium — Solar Cells
	Br 35 Bromine — Sedatives	Kr 36 Krypton — Lasers						
5	Rb 37 Rubidium — Solar Cells	Sr 38 Strontium — Fireworks	Y 39 Yttrium — Color Phosphors	Zr 40 Zirconium — Zircon Gems	Nb 41 Niobium — Mag Lev Trains	Mo 42 Molybdenum — Cutting Tools	Tc 43 Technetium — Medical Diagnosis	Ru 44 Ruthenium — Electric Contacts
	Rh 45 Rhodium — Laboratory Crucibles	Pd 46 Palladium — Pollution Control	Ag 47 Silver — Film	Cd 48 Cadmium — Rechargeable Batteries	In 49 Indium — Electronics	Sn 50 Tin — Cans	Sb 51 Antimony — Type Metal	Te 52 Tellurium — Solar Cells
	I 53 Iodine — Antiseptic	Xe 54 Xenon — Lighthouses						
6	Cs 55 Cesium — Atomic Clocks	Ba 56 Barium — Stomach X-Rays	Lanthanides — See Below	Hf 72 Hafnium — Nuclear Control	Ta 73 Tantalum — Artificial Joints	W 74 Tungsten — Light Bulbs	Re 75 Rhenium — Special Light Bulbs	Os 76 Osmium — Pen Points
	Ir 77 Iridium — Extinction Meteor	Pt 78 Platinum — Jewelry	Au 79 Gold — Jewelry	Hg 80 Mercury — Thermometers	Tl 81 Thallium — Poison	Pb 82 Lead — Weights	Bi 83 Bismuth — Fire Sprinklers	Po 84 Polonium — Anti-Static Brushes
	At 85 Astatine — Few Uses Short-Lived	Rn 86 Radon — Radiation Therapy						
7	Fr 87 Francium — Few Uses Short-Lived	Ra 88 Radium — Luminous Paint	Actinides — See Below	Rf 104 Rutherfordium	Db 105 Dubnium	Sg 106 Seaborgium	Bh 107 Bohrium	Hs 108 Hassium
	Mt 109 Meitnerium	Uun 110 Ununnilium	Uuu 111 Unununium	Uub 112 Ununbium	Uut 113 Ununtrium	Uuq 114 Ununquadium	Uup 115 Ununpentium	Uuh 116 Ununhexium
	Uus 117 Ununseptium	Uuo 118 Ununoctium						

Non-Metals | Metals | TRANSITION METALS

Trans-Actinides: These man-made atoms exist for less than a second.

Element 112 was the highest-numbered element yet created, as of 1996.

Lanthanides or Rare Earth Metals →	La 57 Lanthanum — Arc Lamps	Ce 58 Cerium — Lighter Flints	Pr 59 Praseodymium — Welder's Goggles	Nd 60 Neodymium — Telescopes	Pm 61 Promethium — Spacecraft Power	Sm 62 Samarium — Arc Lamps	Eu 63 Europium — Color Phosphors	Gd 64 Gadolinium — Nuclear Control	Tb 65 Terbium — Lasers	Dy 66 Dysprosium — Nuclear Control	Ho 67 Holmium — Color Phosphors	Er 68 Erbium — Color Phosphors	Tm 69 Thulium — Color Phosphors	Yb 70 Ytterbium — Color Phosphors	Lu 71 Lutetium — Color Phosphors
Actinides →	Ac 89 Actinium — Neutron Source	Th 90 Thorium — Lantern Mantles	Pa 91 Protactinium — Few Uses Very Rare	U 92 Uranium — Nuclear Power	Np 93 Neptunium — Neutron Detectors	Pu 94 Plutonium — Nuclear Weapons	Am 95 Americium — Smoke Detectors	Cm 96 Curium — Spacecraft Power	Bk 97 Berkelium — Few Uses	Cf 98 Californium — Gauges	Es 99 Einsteinium — Short-Lived (Months)	Fm 100 Fermium — Short-Lived (Days)	Md 101 Mendelevium — Short-Lived (Hours)	No 102 Nobelium — Short-Lived (Minutes)	Lr 103 Lawrencium — Short-Lived (Seconds)

Key

Symbol → C 6 ← Atomic Number
Name → Carbon
Use or Occurrence → Plants and Animals

The atomic number is the number of protons in an atom.

Solid, Liquid, Gas — at room temperature

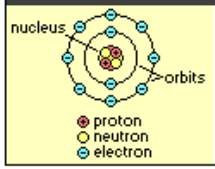
Radioactive

Man-Made

Color Key

- Alkali Metals
- Alkali Earth Metals
- Transition Metals
- Other Metals
- Other Non-Metals
- Halogens
- Inert Gases
- Lanthanides
- Actinides
- Trans-Actinides

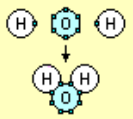
Atoms



Atoms have a nucleus of protons and neutrons surrounded by electrons.

The number of electrons in an uncharged atom is the same as the number of protons.

Molecules



H_2O

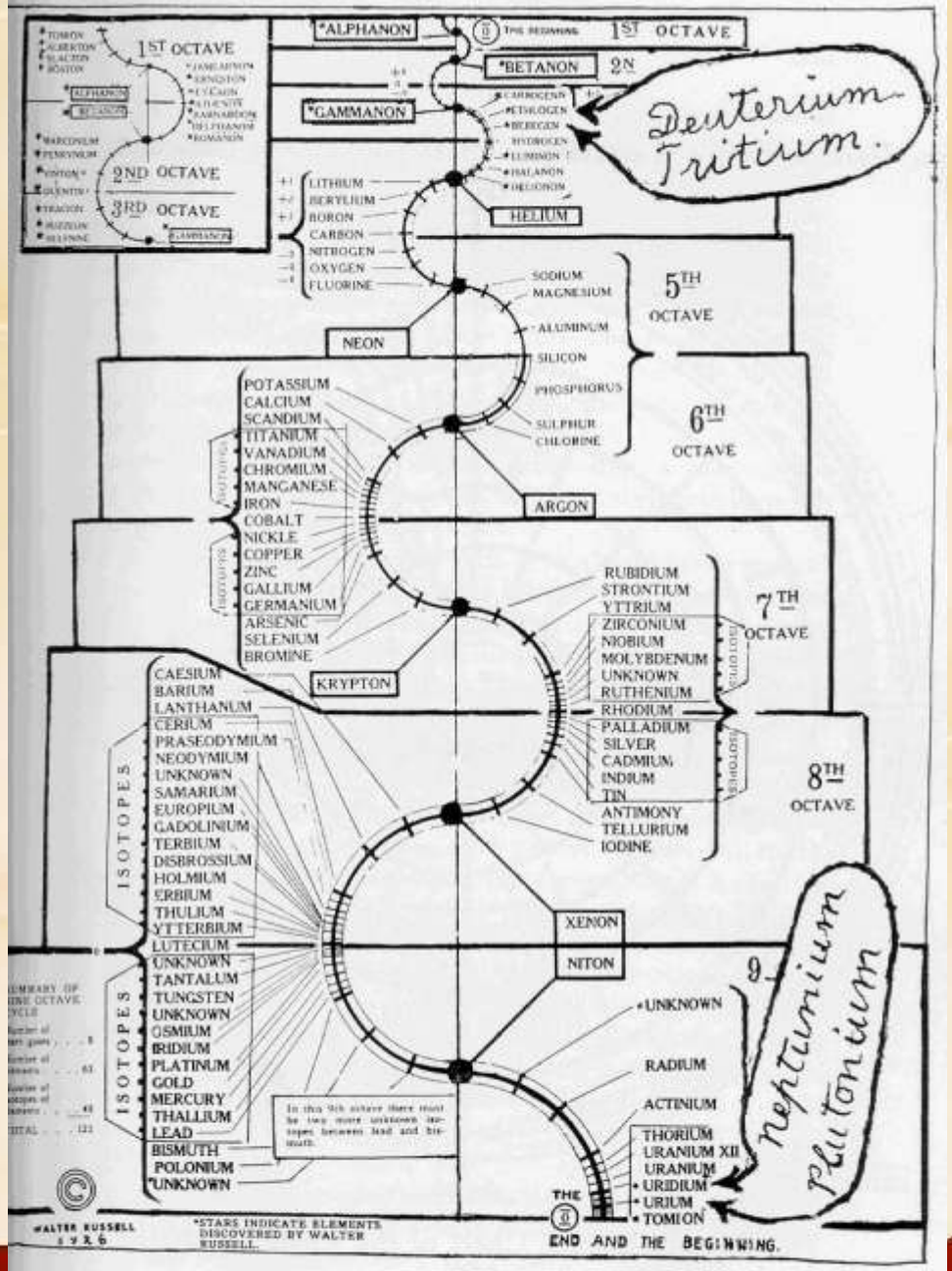
Atoms combine to make molecules by sharing or trading their outer electrons.

Many atoms prefer to have eight electrons in their outer orbit like the oxygen atom in H_2O.

Groups

The vertical columns are called groups. Elements in the same group behave similarly because they have the same number of outer electrons.

Group 1 has one outer electron, group 2 has two, etc. Most transition metals have two.



The Russell Periodic Chart of the Elements, No. I

CrystalMaker Element Tables

VFI Atomic Radii

http://www.crystalmaker.com

Image generated by CrystalMaker 6.3: interactive crystal & molecular structures visualization for Mac OS X

These data are based on interatomic distances in the structures of the elements. (Radii for metals correspond to coordination numbers of 12.) Where no radius value can be found for a particular element, its radius has been set to a default value of 1 Å and a circle is plotted instead of a rendered sphere. Data from Vainshtein et al., 1995; values for O, F, S, Cl, Br, I, At, Po, Pm, Rn have been taken from Clementi et al.1963.

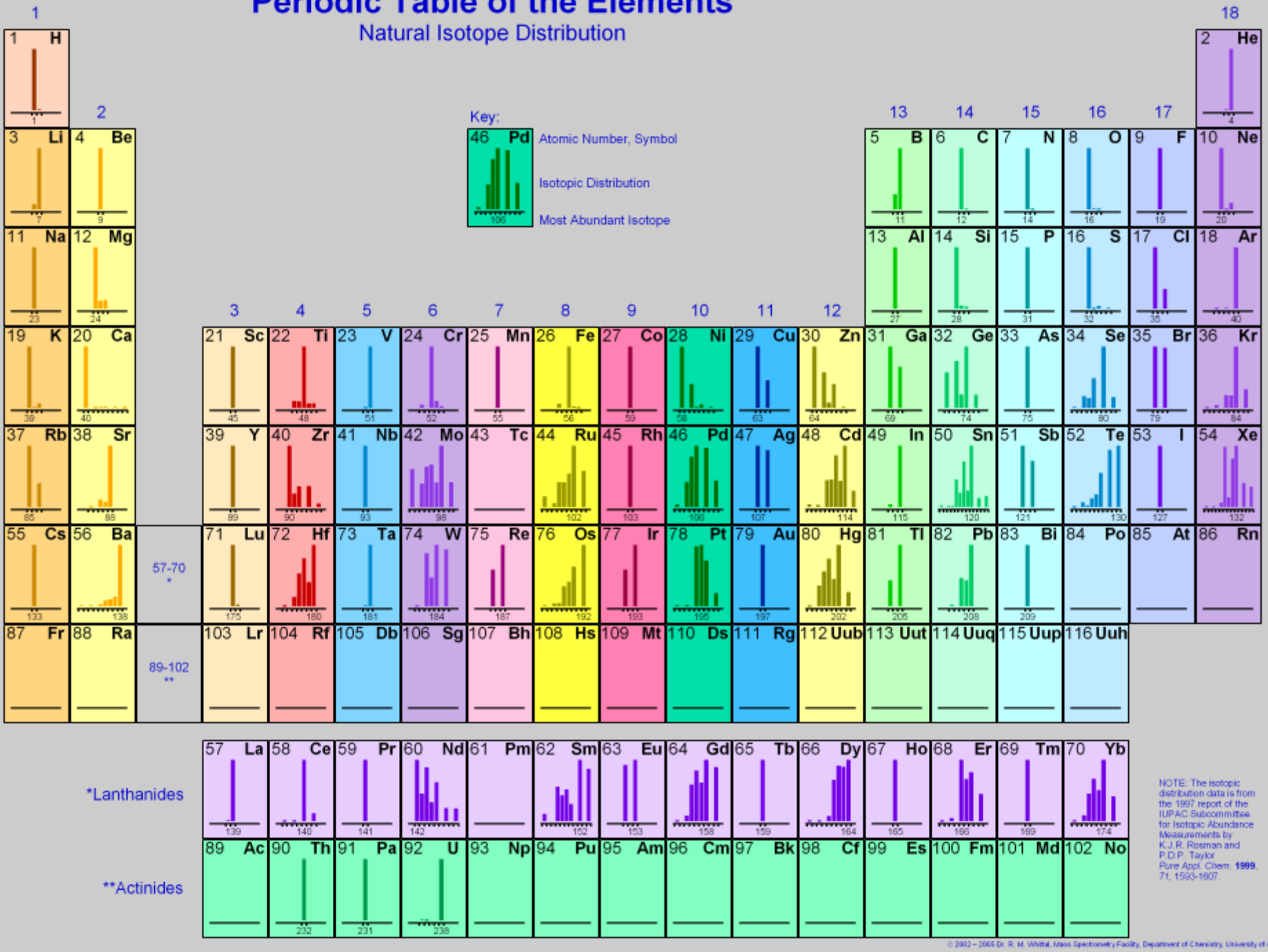
References: Vainshtein BK, Fridkin VM, Indenbom VL (1995) Structure of Crystals, 3rd Edition. Springer Verlag, Berlin.

Clementi E, Raimondi DL, Reinhardt WP (1963) Journal of Chemical Physics 38:2686-

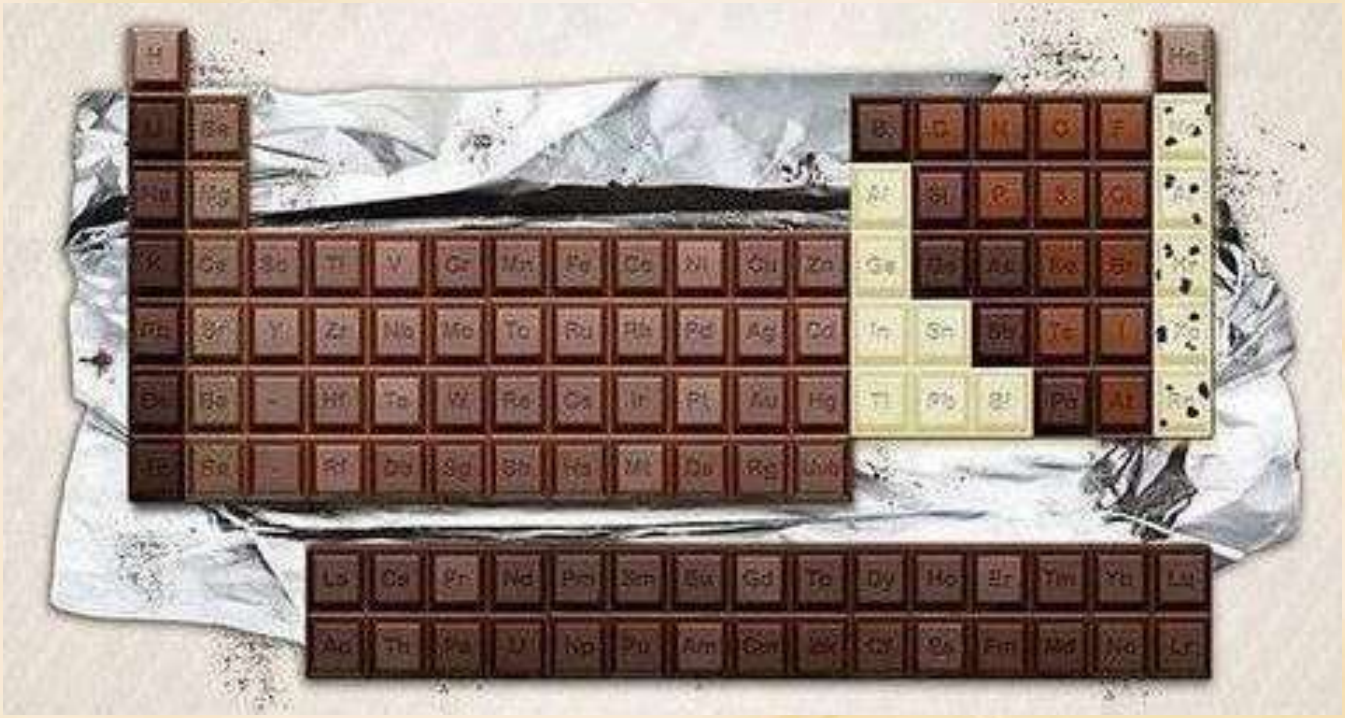
CrystalMaker SOFTWARE

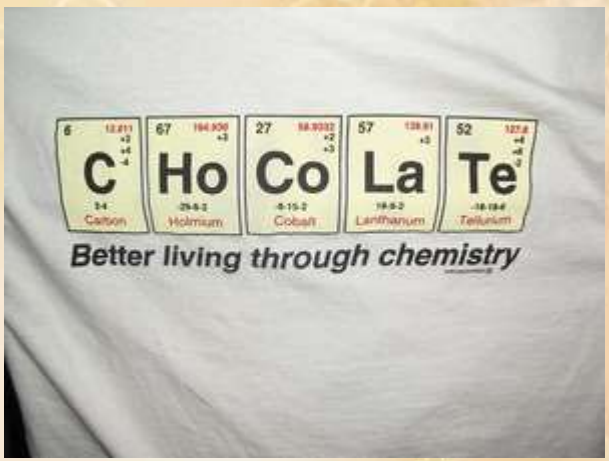
Periodic Table of the Elements

Natural Isotope Distribution



NOTE: The isotopic distribution data is from the 1997 report of the IUPAC Subcommittee for Isotopic Abundance Measurements by K.J.R. Rosman and P.D.P. Taylor *Pure Appl. Chem.* **1999**, *71*, 1593-1607.




C
Ho
Co
La
Te
Carbon
Holmium
Cobalt
Lanthanum
Tellurium
Better living through chemistry


H
Be
Mg
Na
Ca
K
Sr
Rb
Ba
Ra
Fr


Periodic Table of the Elements
According to Organic Chemists

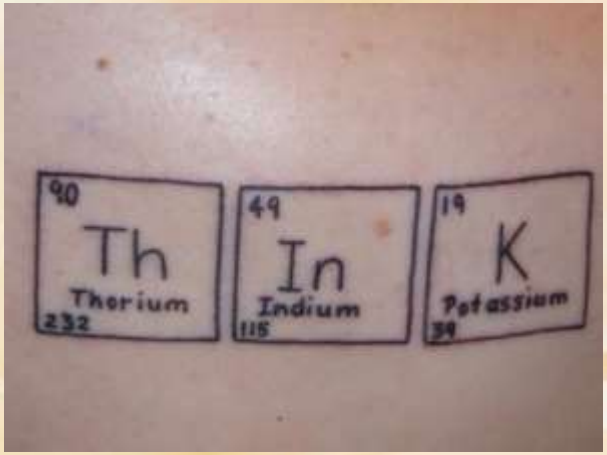

4
Be
Beryllium
68
Er
Erbium

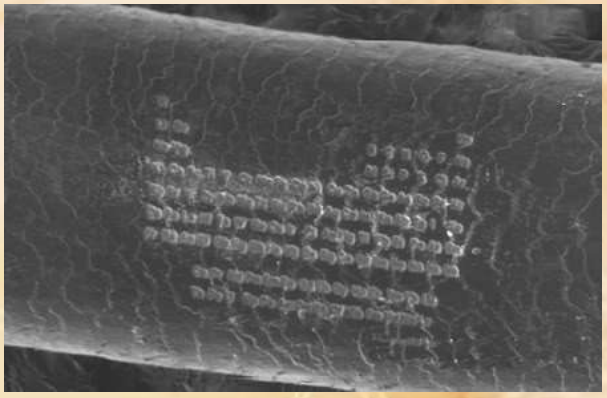

JUST GO ELEMENTAL


THE PERIODIC TABLE
OF ELEMENTS

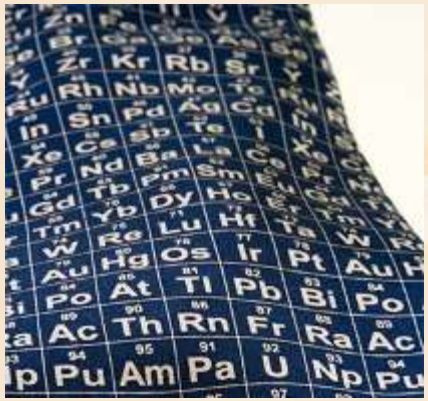

68
Er
167.26
85
At
209.99
74
W
183.84


Mn
Ho
Sb
Ba
Co
N


90
Th
Therium
232
49
In
Indium
115
19
K
Potassium
39




6
C
12.011



Jesús Gracia Mora

Jesús Gracia Mora


PERIODIC TABLE OF THE ELEMENTS


213
Uo
Unobtainium


Ge
Ni
U
S


Ge
S

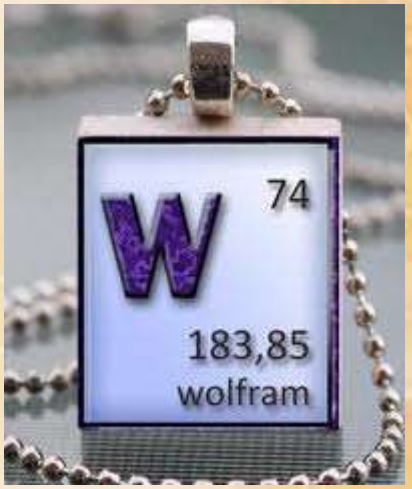

79
Au
196.97
47
Ag
107.87
78
Pt
195.08

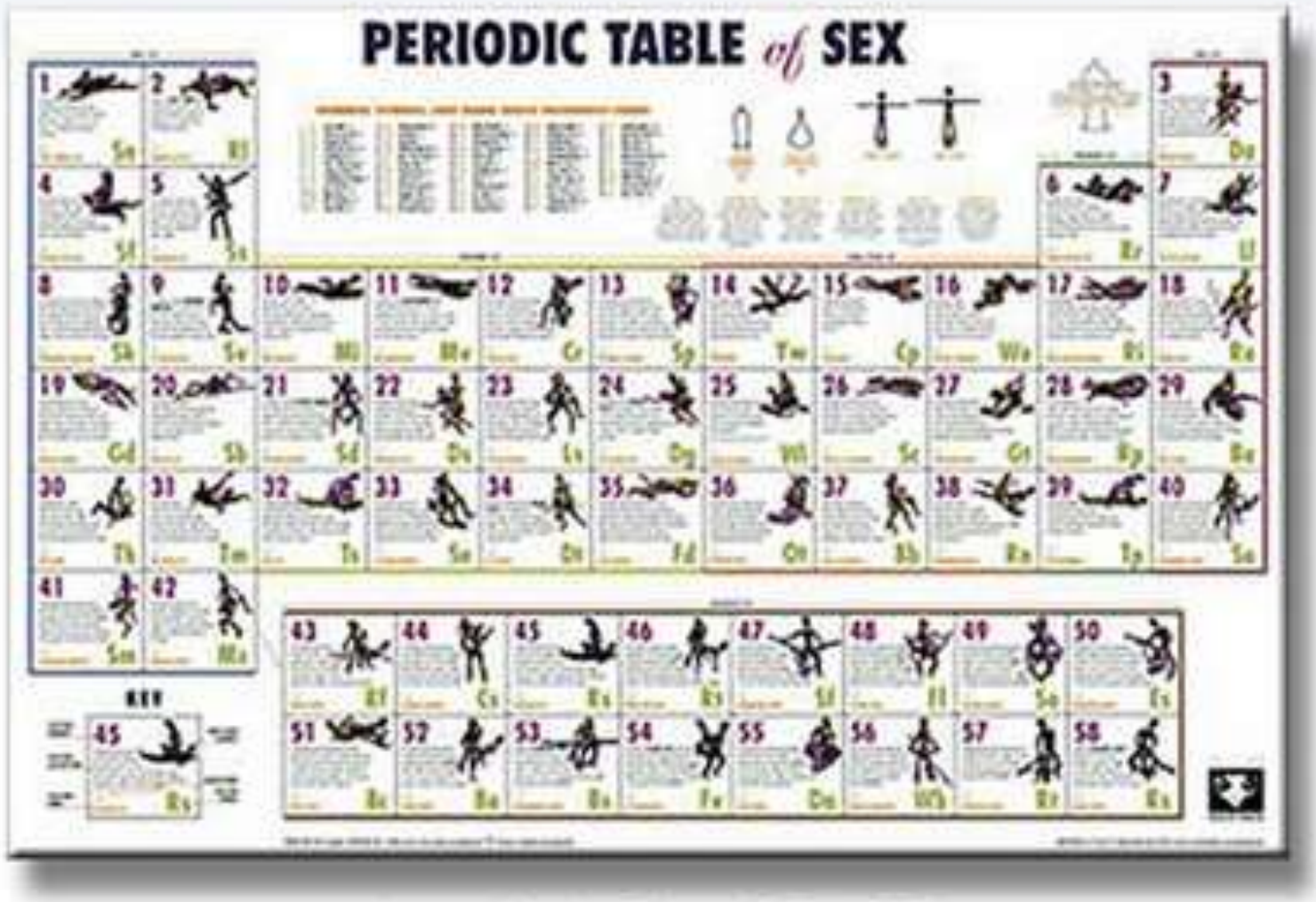

Mb


47
Ag
silver
107,87


47
Ag
107,87


11
Na
22,99
SODIUM


74
W
183,85
wolfram

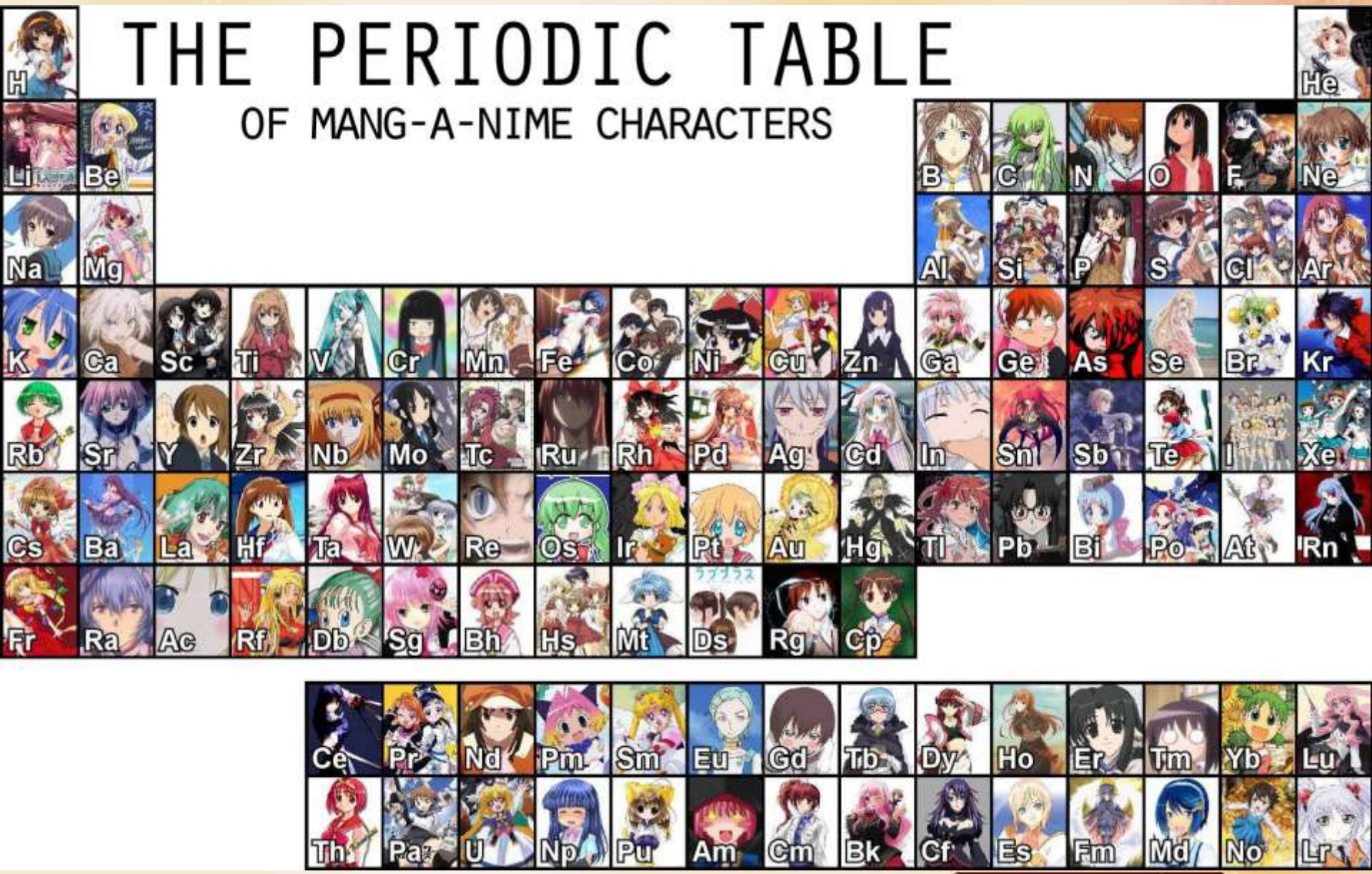


Approximate Size: 24" x 36"

25 Bs  Beef sausage	26 R  Beef ribs	27 Kb  Kobe	28 Rt  Pot roast	29 Cr  Crab	30 Tu  Tuna
43 Td  Beef tenderloin	44 S  T-bone steak	45 Fm  Filet Mignon	46 Sf  Stroganoff	47 St  Beef stew	48 Cb  Chicken cordon bleu
61 Pr  Pepper steak	62 Tt  Steak Tartare	63 Si  Strip steak	64 Md  Mandarin beef	65 Bt  Brisket	66 Cs  Chicken casserole

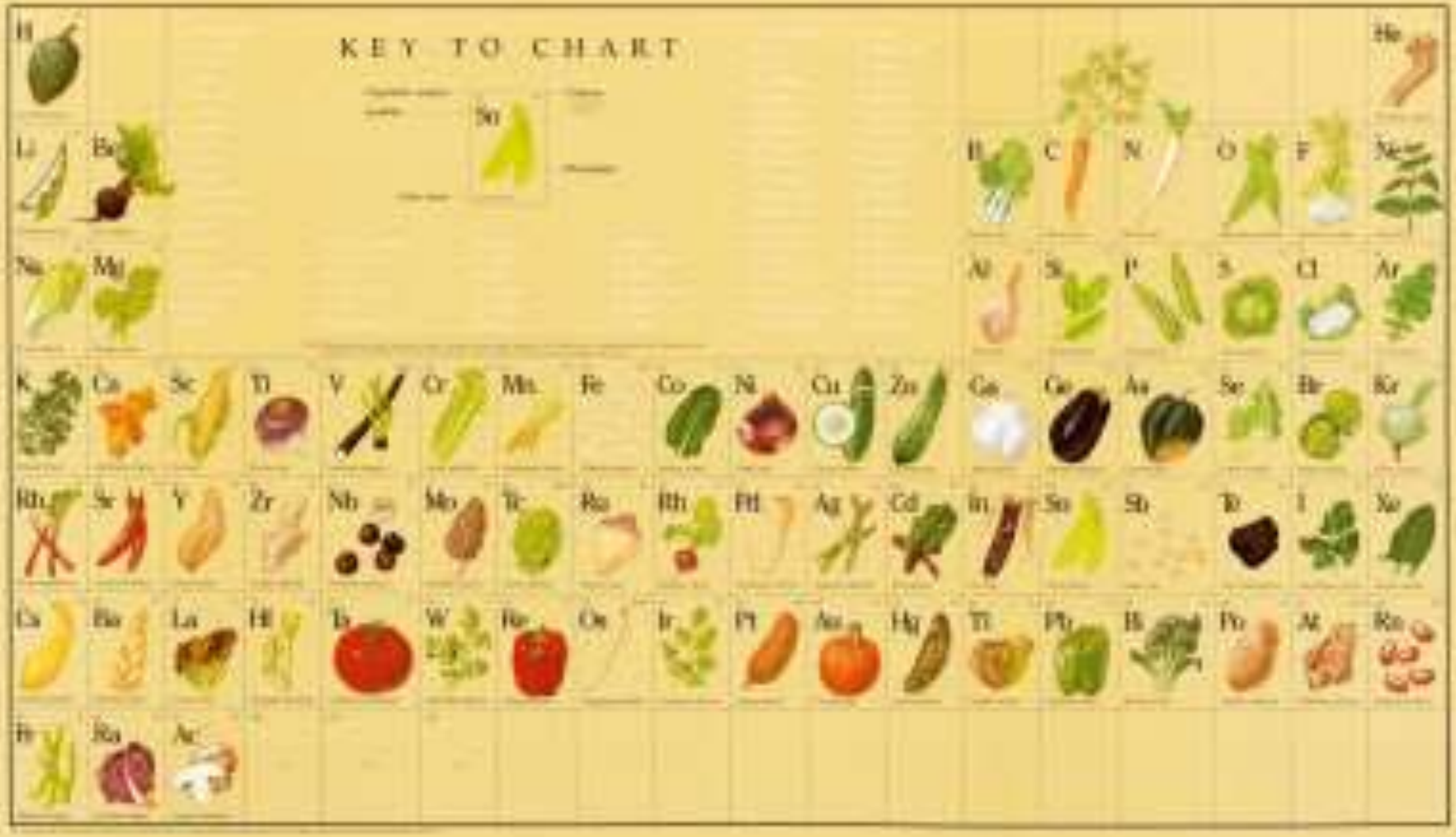
THE PERIODIC TABLE

OF MANG-A-NIME CHARACTERS



Jesús Gracia Mora

PERIODIC TABLE OF THE VEGETABLES



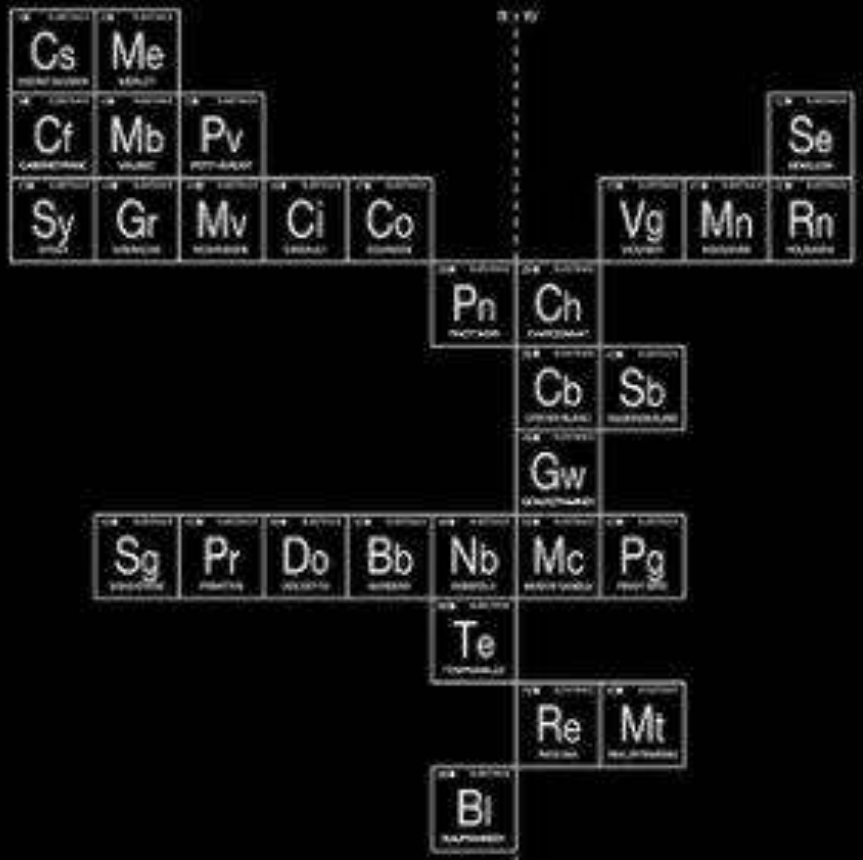

Ru
Re
Nd
Pm
Sm
Eu
Rn

Periodic Table of Caffeine Beverages

Jesús Gracia Mora

Su SUBSTANCE

WASHINGTON STATE PERIODIC TABLE OF WINES



CLASSIC AREAS OF ORIGIN

BORDEAUX

BORDEAUX

RHONE

BURGUNDY

LOIRE

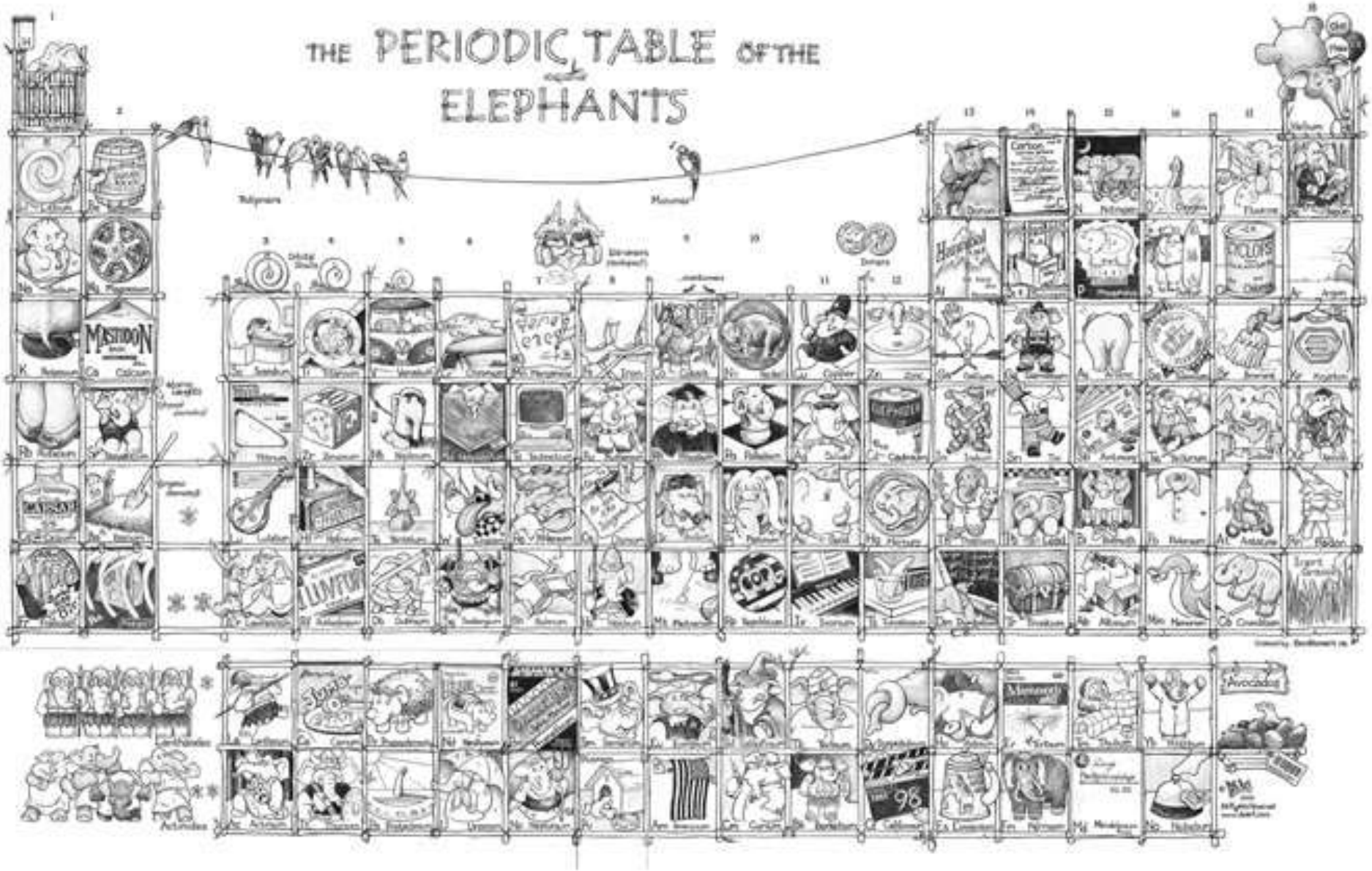
ALSACE

ITALY

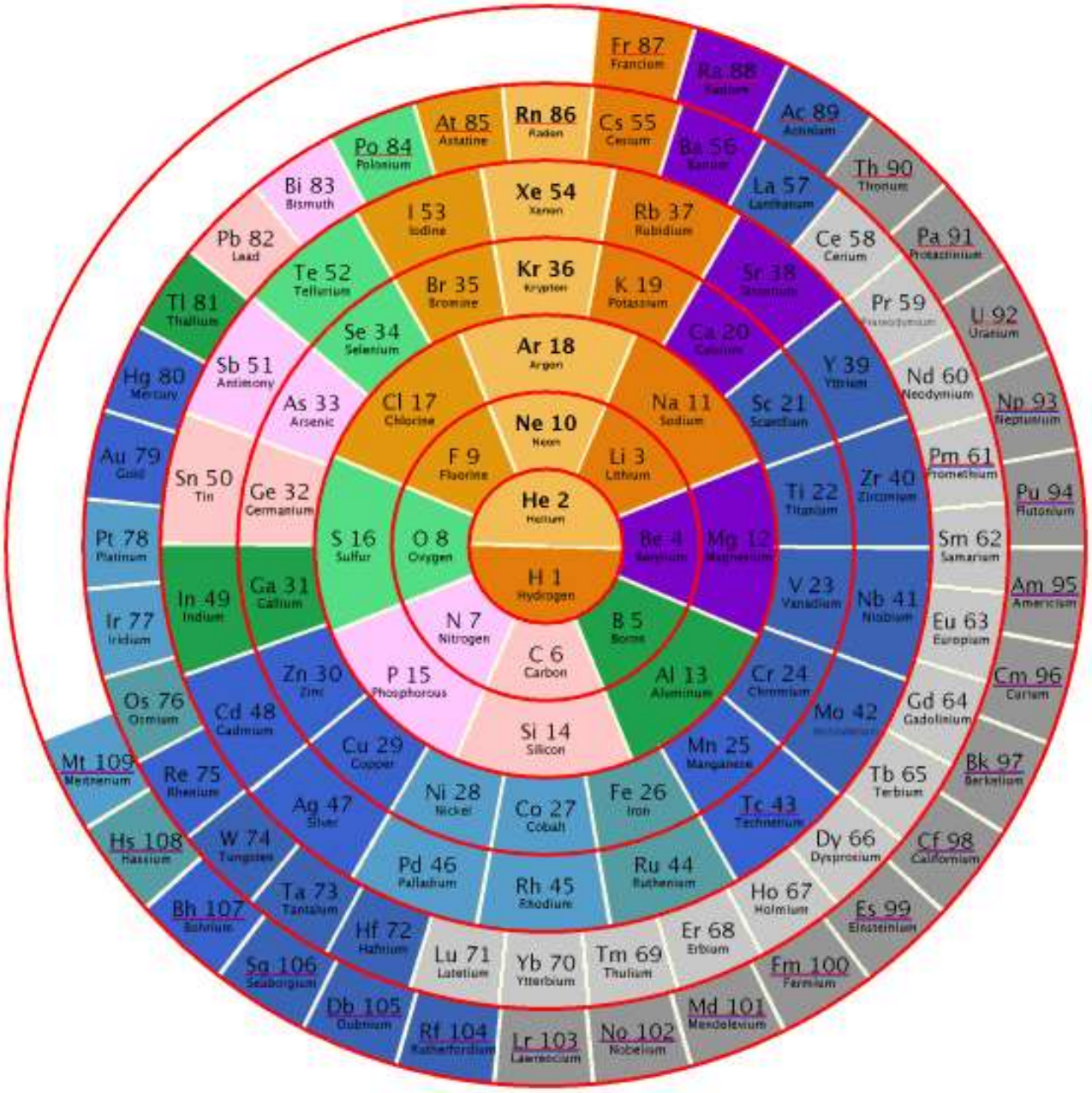
SPAIN

GERMANY

AUSTRIA


THE PERIODIC TABLE OF THE ELEPHANTS

Mayan Periodic Chart of the Elements

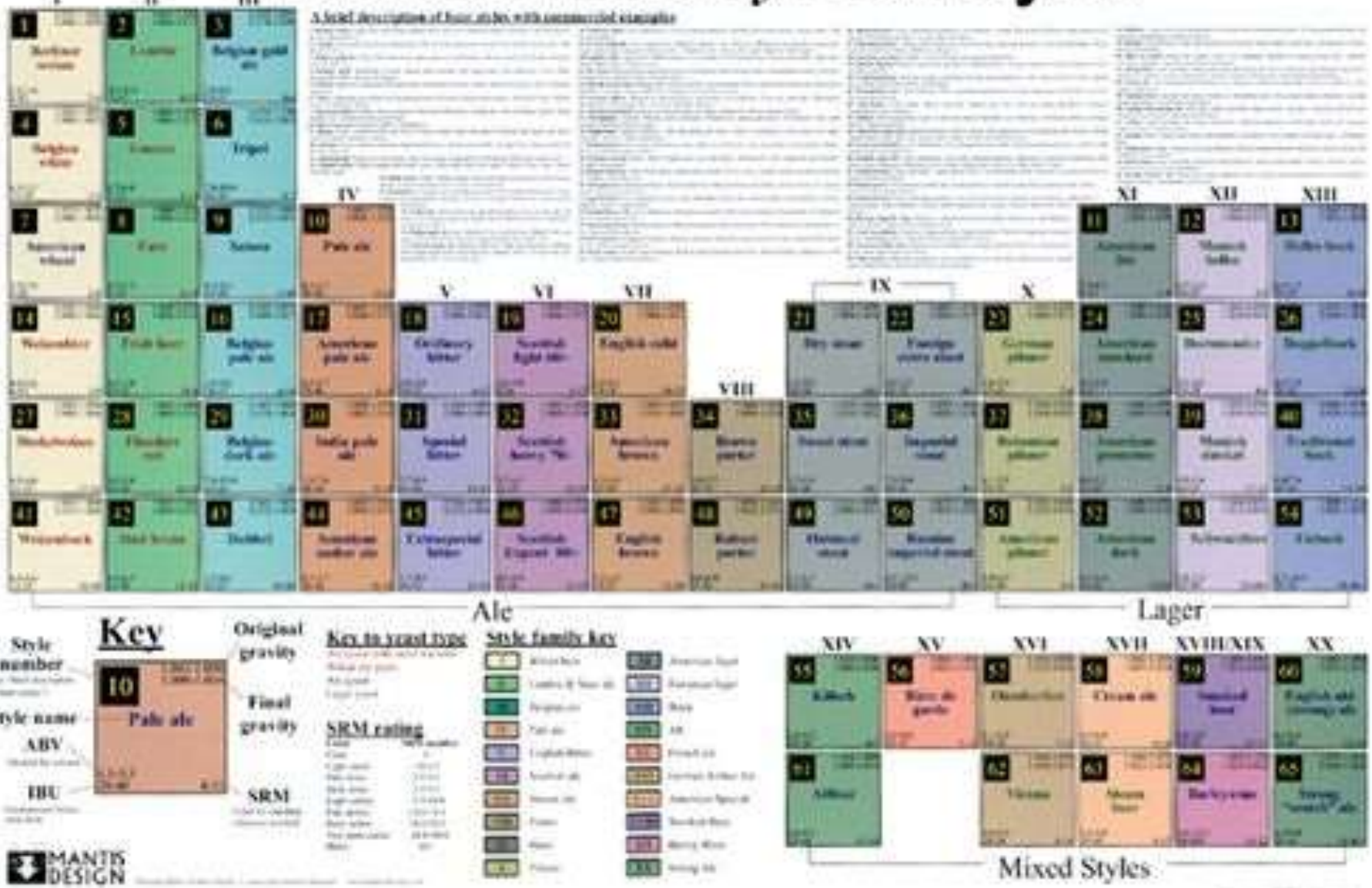


The Periodic Table of Dessert

																	B 7.2 Butter
M 3.0 Honey	Sa 0 Salt									Ai 0 Air	F 3.6 Flour	V 2.8 Vanilla	O 1.5 Egg	Lt 0.61 Milk			
Cs 2.8 Corn Syrup	Ci – Cinnamon									Gl 0 Ice	Oa 3.7 Oatmeal	C 5.0 Chocolate	So 0 Baking Soda	Cr 3.5 Cream			
Sm 2.9 Sorghum	N – Nutmeg	Pn 6.9 Pecan	Ar 5.8 Cashew	Pi 5.7 Pistachio	Fi 6.3 Hazelnut	W 6.5 Walnut				Mc 7.2 Macadamia	Ct 2.4 Chestnut	Al 5.8 Almond	P 5.9 Peanut Butter	Cc 2.3 Coconut Milk			
Ms 2.6 Maple Syrup	Cl – Clove	Cf – Coffee	Mi – Mint	An – Anise	Lc – Licorice	Ps 5.3 Poppy Seed				Ti 5.9 Tahini	Ta 3.6 Tapioca	Mp 4.6 Marzipan	Ge 3.6 Gelatin	Vs 8.8 Shortening			
Bs 3.7 Brown Sugar	Ca – Cardamom	Cn 3.5 Candied Citron	Dt 2.7 Date	Pr 2.4 Prune	R 3.0 Raisin	Fg 2.6 Fig				Mm 2.9 Mincemeat	Rh 0.21 Rhubarb	Pu 0.2 Pumpkin	Mw 3.2 Marsh-mallow	La 9.0 Lard			
Mo 2.3 Molasses	G – Ginger									Fc 0 Food Coloring	Dr 3.8 Little Silver Balls	J 3.9 Sprinkles	Gc 4.2 Icing	Ri 1.7 Ricotta			

L 0.29 Lemon	Li 0.30 Lime	Or 0.47 Orange	A 0.58 Apple	Ba 0.92 Banana	At 0.49 Apricot	Rb 0.49 Raspberry	Bb 0.56 Blueberry	Ce 0.72 Cherry	Sb 0.30 Strawberry
Ma 1.5 Marsala	To 1.5 Tokay	Br 2.4 Brandy	Wh 2.5 Whiskey	Bn 2.5 Bourbon	Rm 2.3 Rum	Gm 2.4 Grand Marnier	Cm 3.7 Crème de Menthe	Fr 1.5 Frangelico	Co 1.5 Crème de Cacao

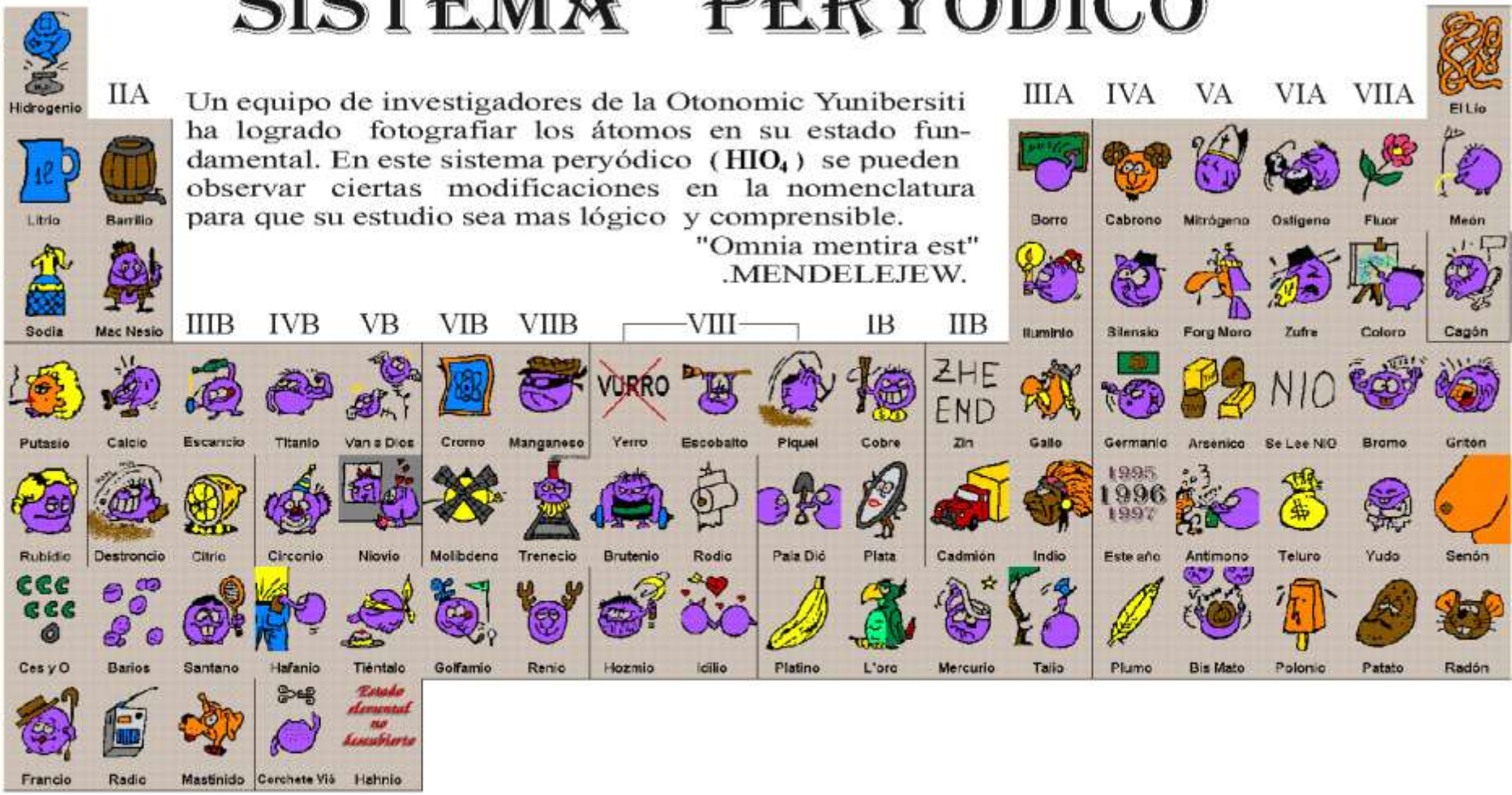
Periodic Table of Beer Styles



SISTEMA PERYODICO

Un equipo de investigadores de la Otonomic Yunibersiti ha logrado fotografiar los átomos en su estado fundamental. En este sistema peryódico (HIO_4) se pueden observar ciertas modificaciones en la nomenclatura para que su estudio sea mas lógico y comprensible.

"Omnia mentira est"
.MENDELEJEW.




PERIODIC TABLE of MIXOLOGY
KEY
20 Mg

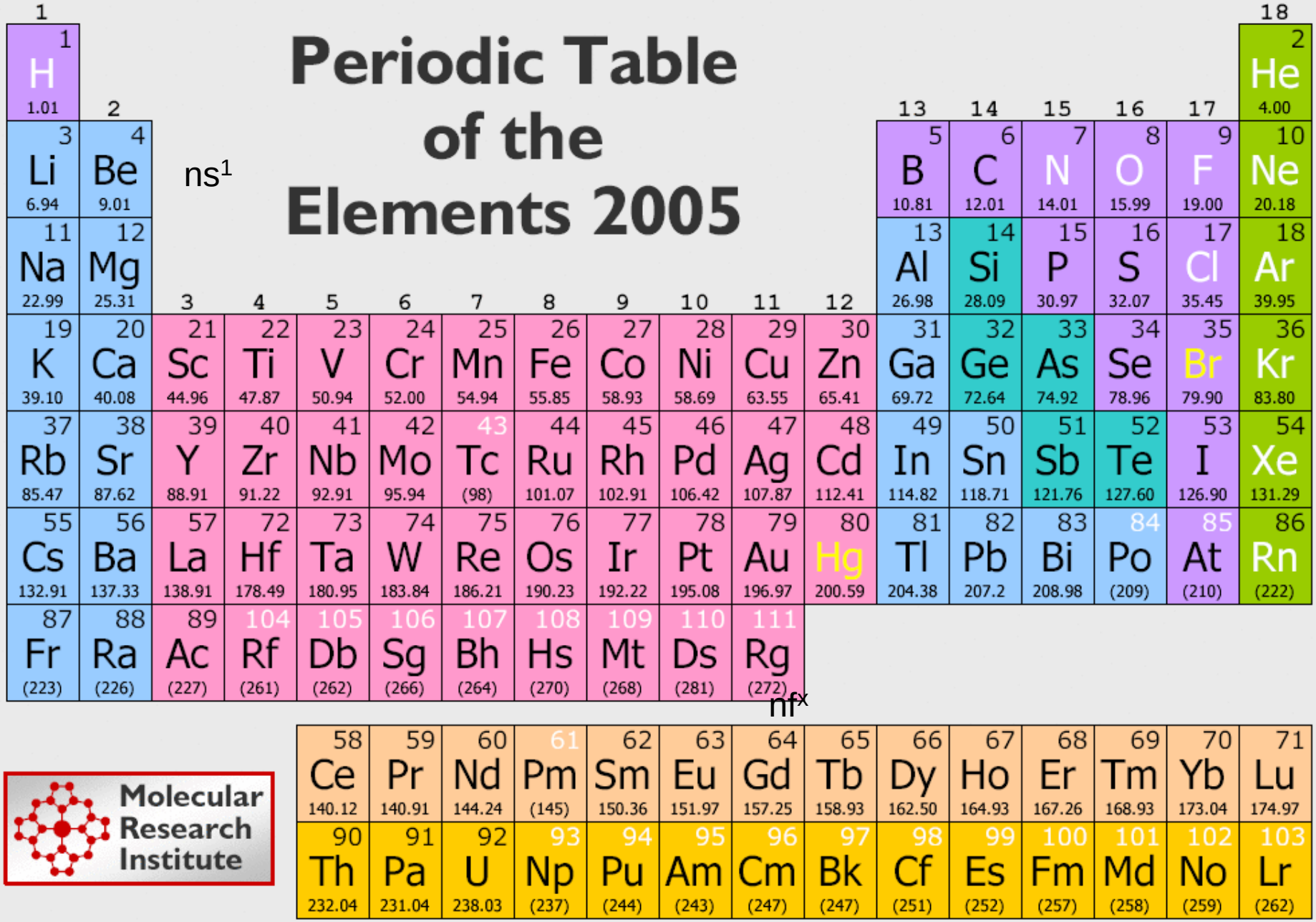
Tabla periódica

¿Qué es periodicidad?

Tabla periódica

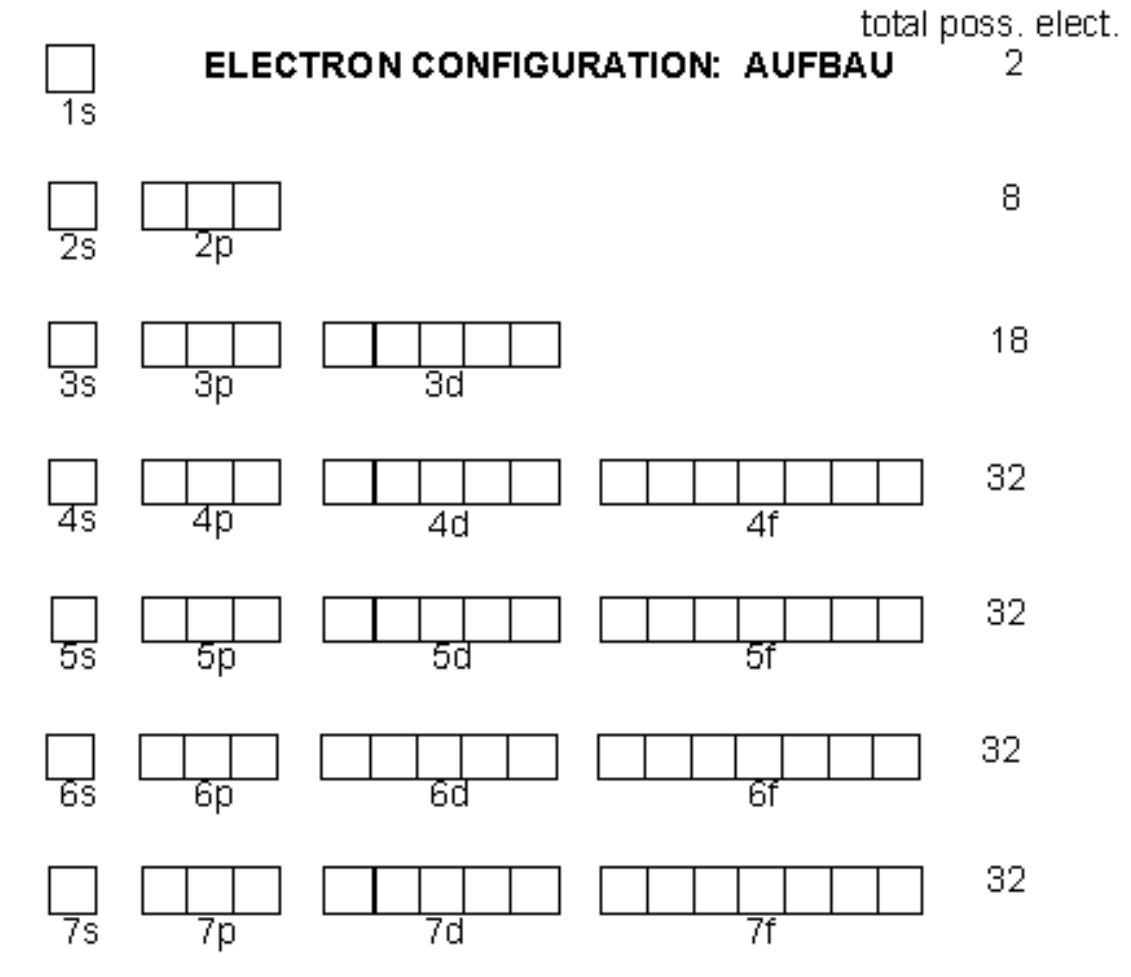
Para entender la periodicidad y la ley periódica de deben de revisar algunas propiedades.

Periodic Table of the Elements 2005

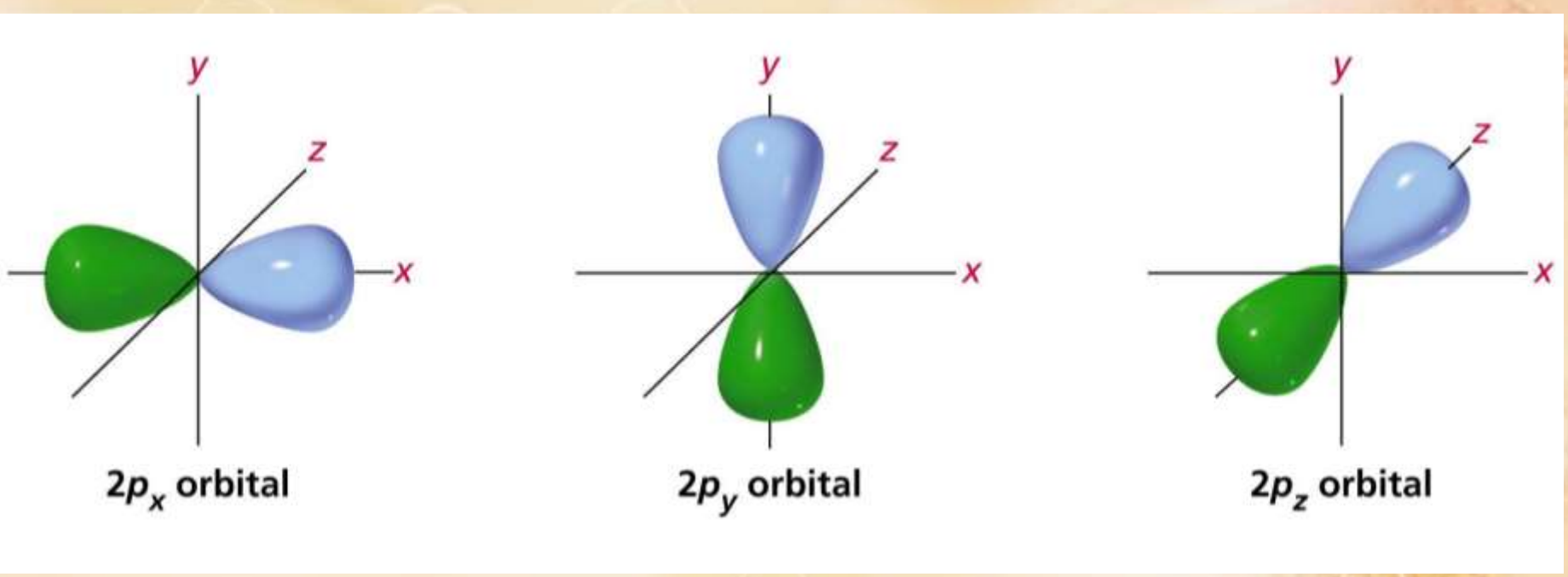


Molecular Research Institute

Configuración electrónica



Forma de los orbitales



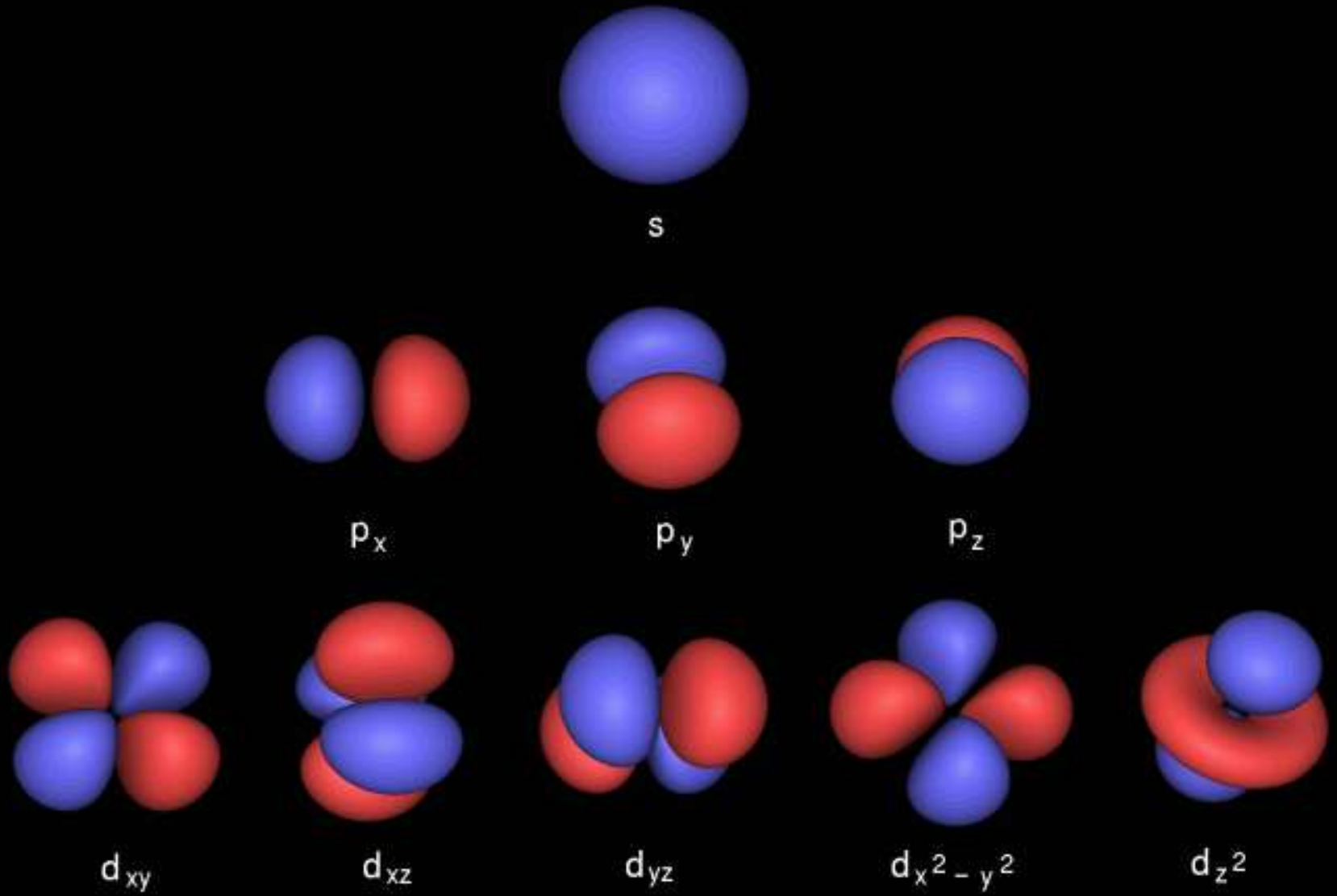

s
p_x
p_y
p_z
d_{xy}
d_{xz}
d_{yz}
$d_{x^2-y^2}$
d_{z^2}

Tabla periódica y configuración electrónica

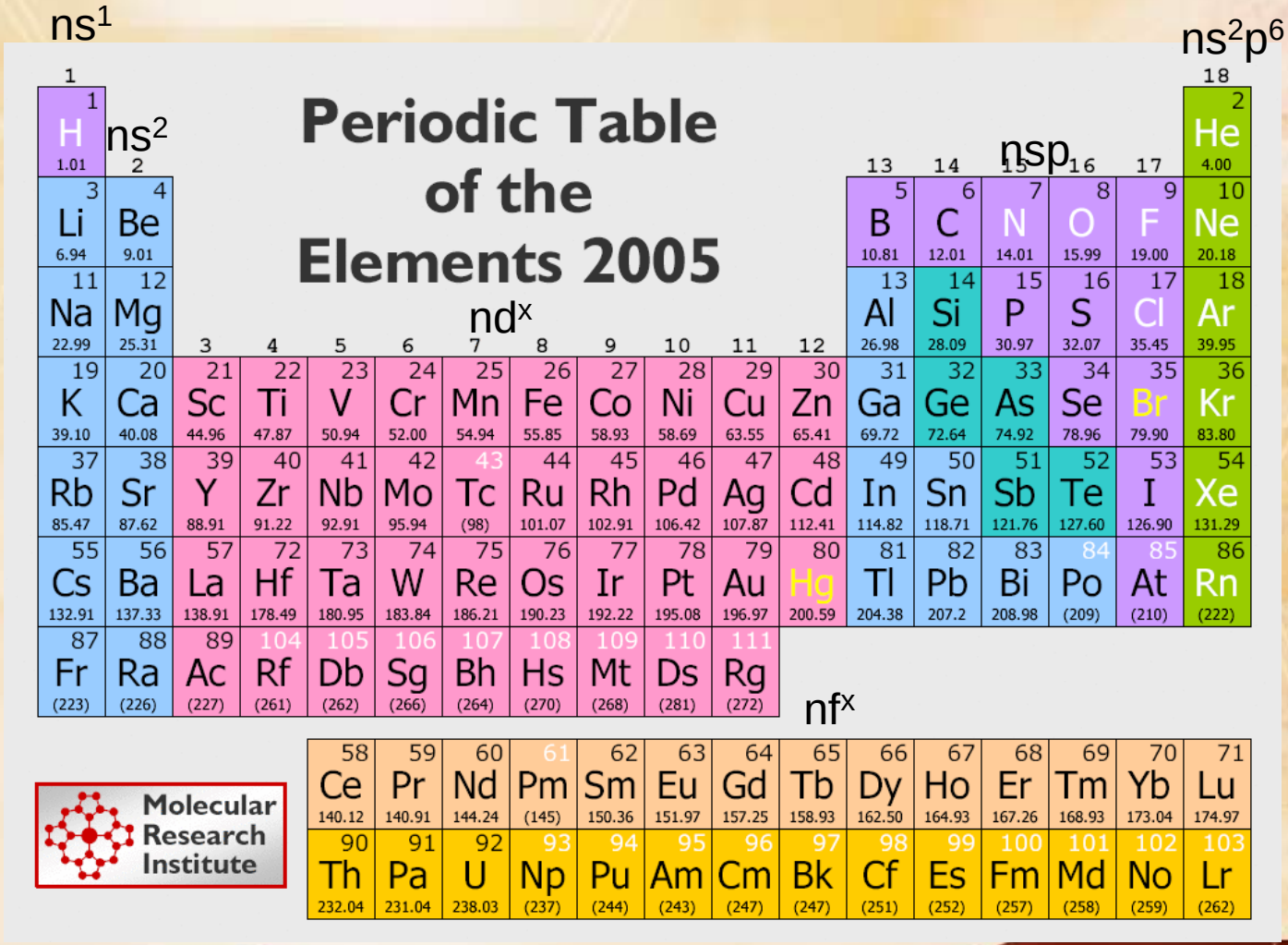
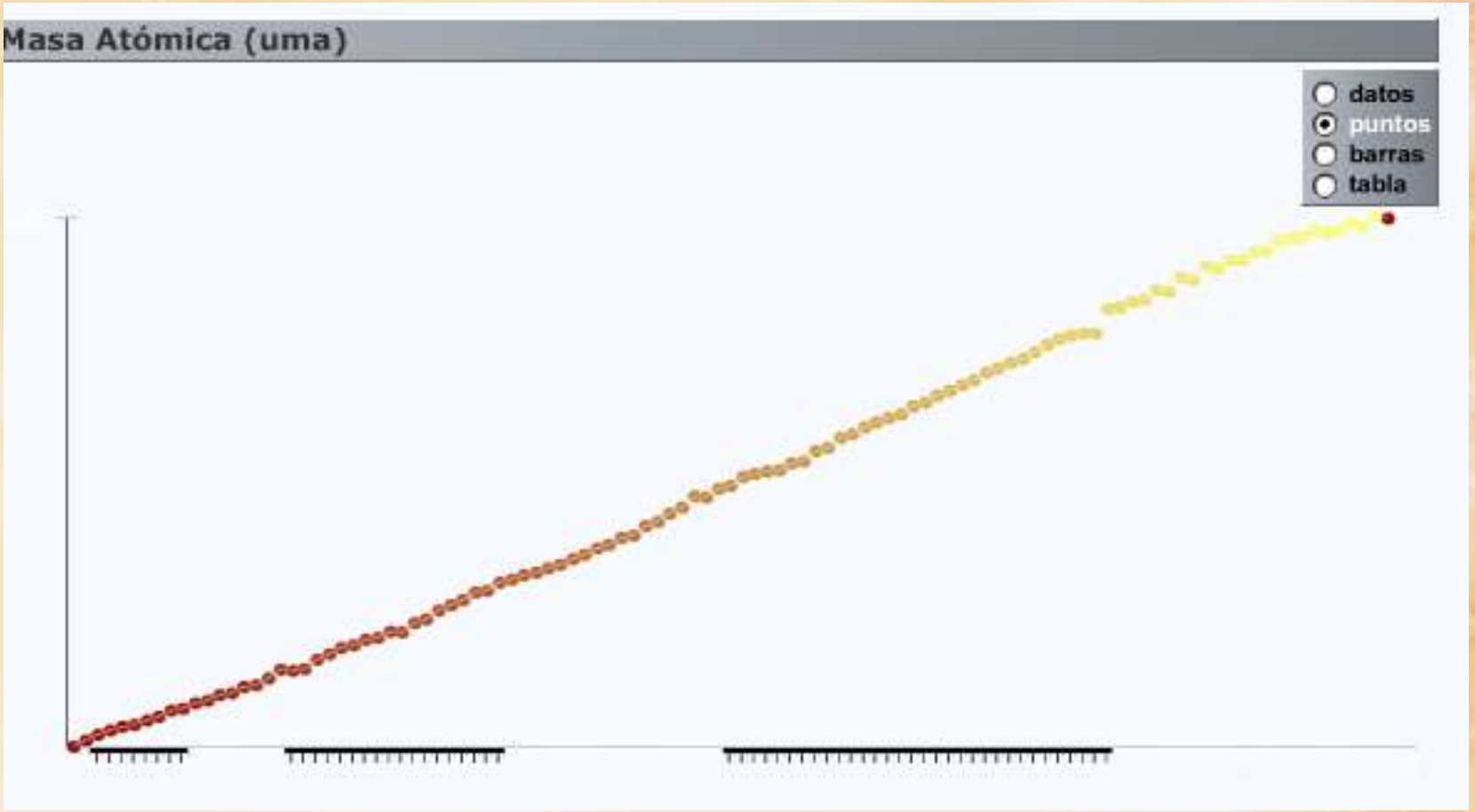
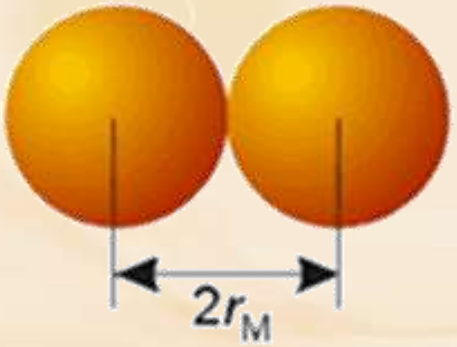


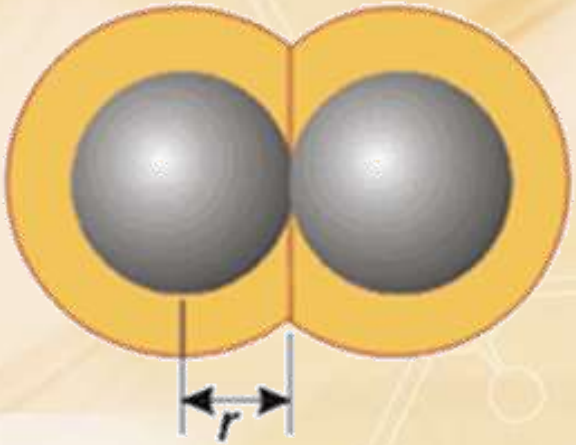
Tabla periódica



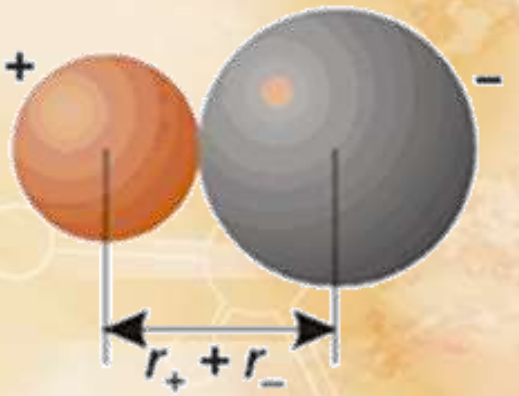
¿Que es el rádio?



Radio metálico

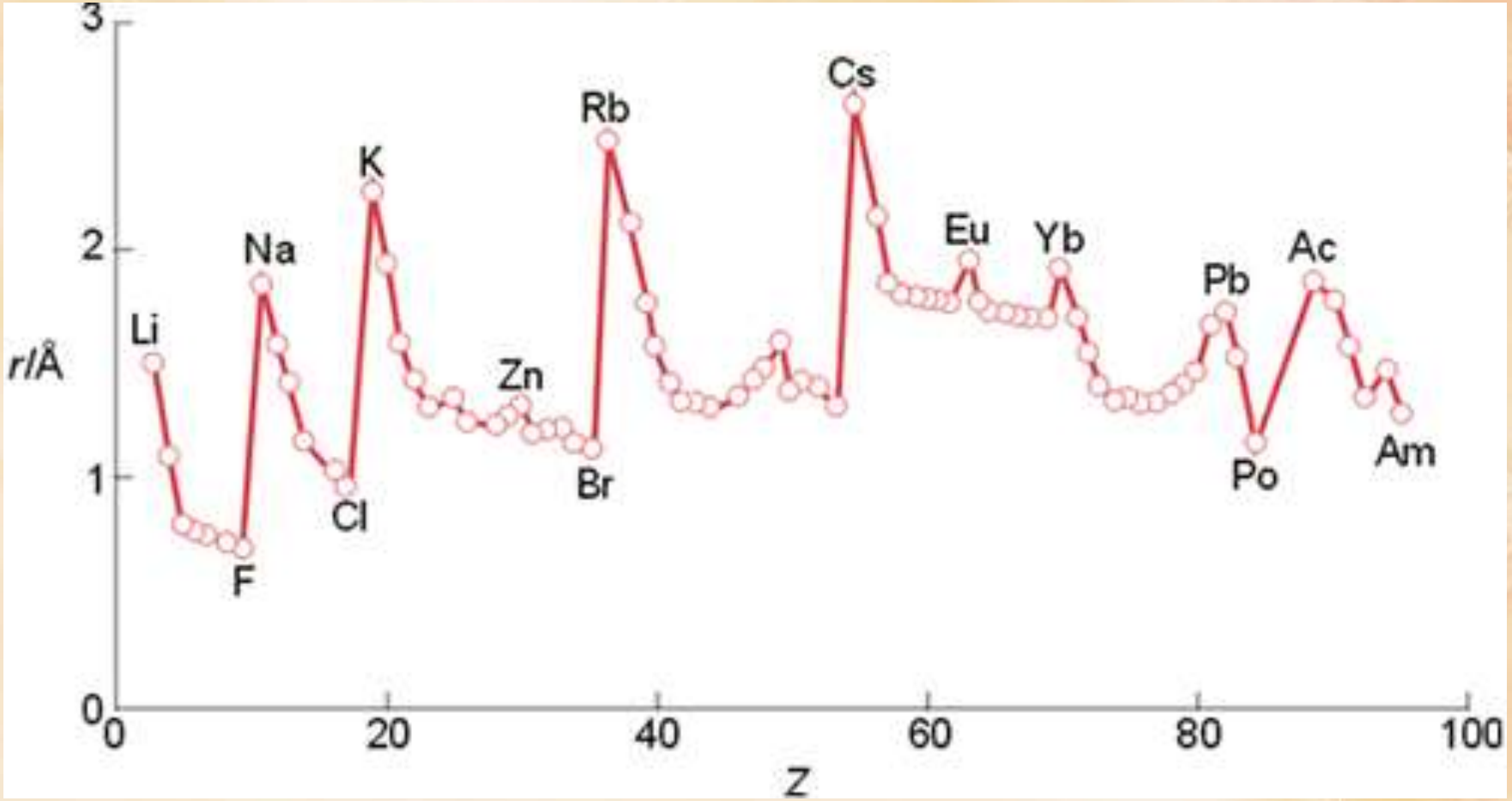


Radio covalente



Radio iónico

Radio atómico



Energía de ionización

Es la energía necesaria para arrancarle un electrón a un átomo neutro en fase gas.

1ra energía de ionización

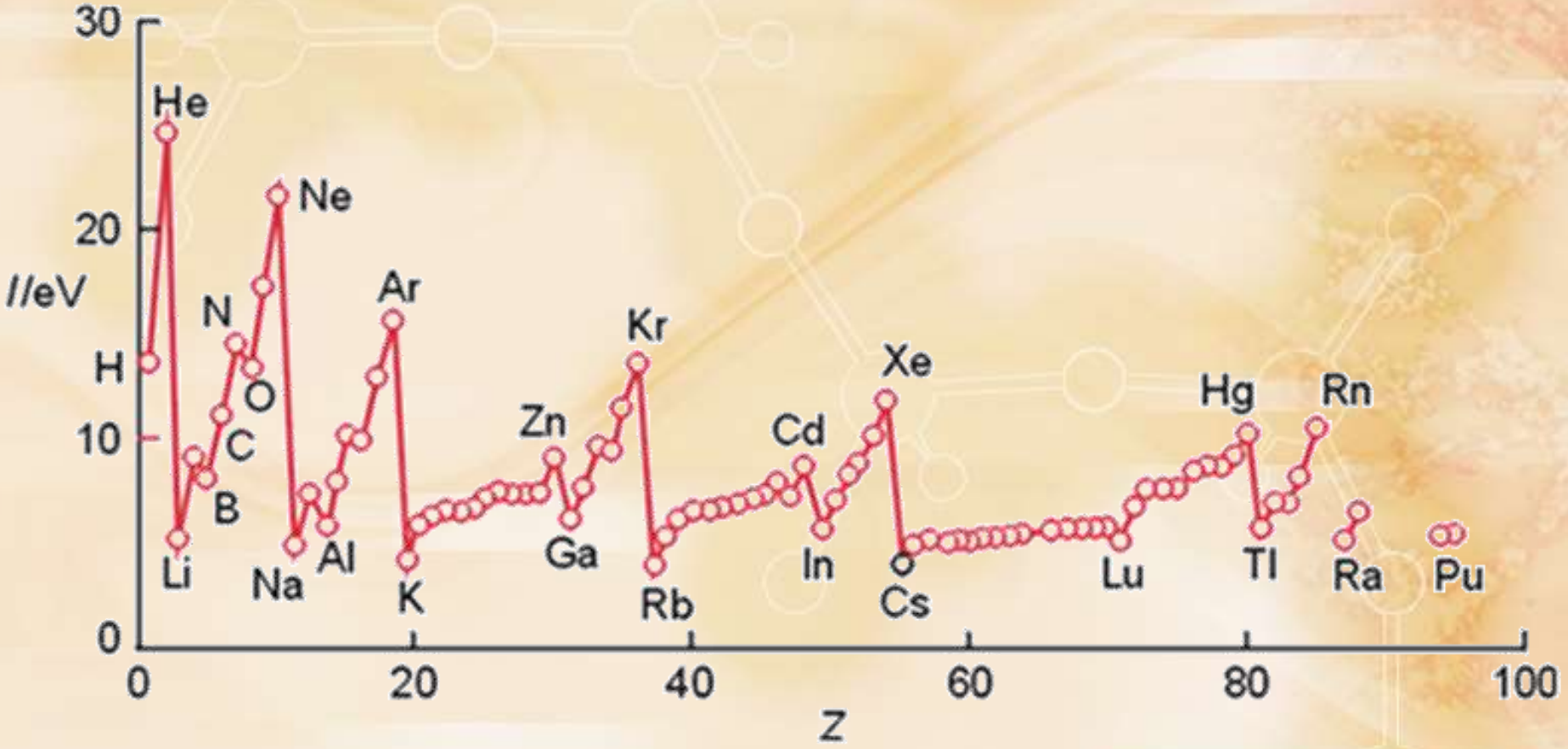


Tabla periódica

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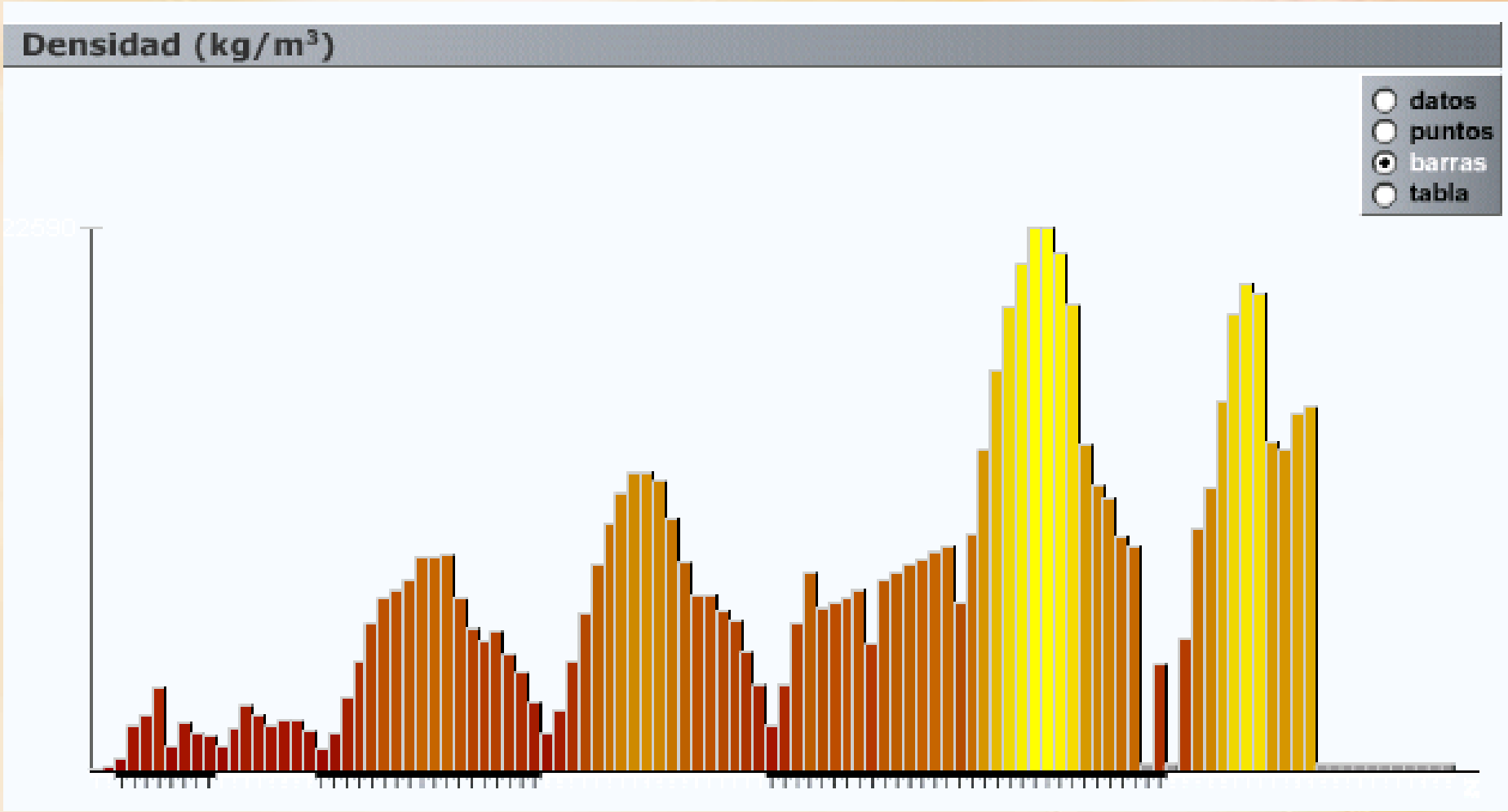

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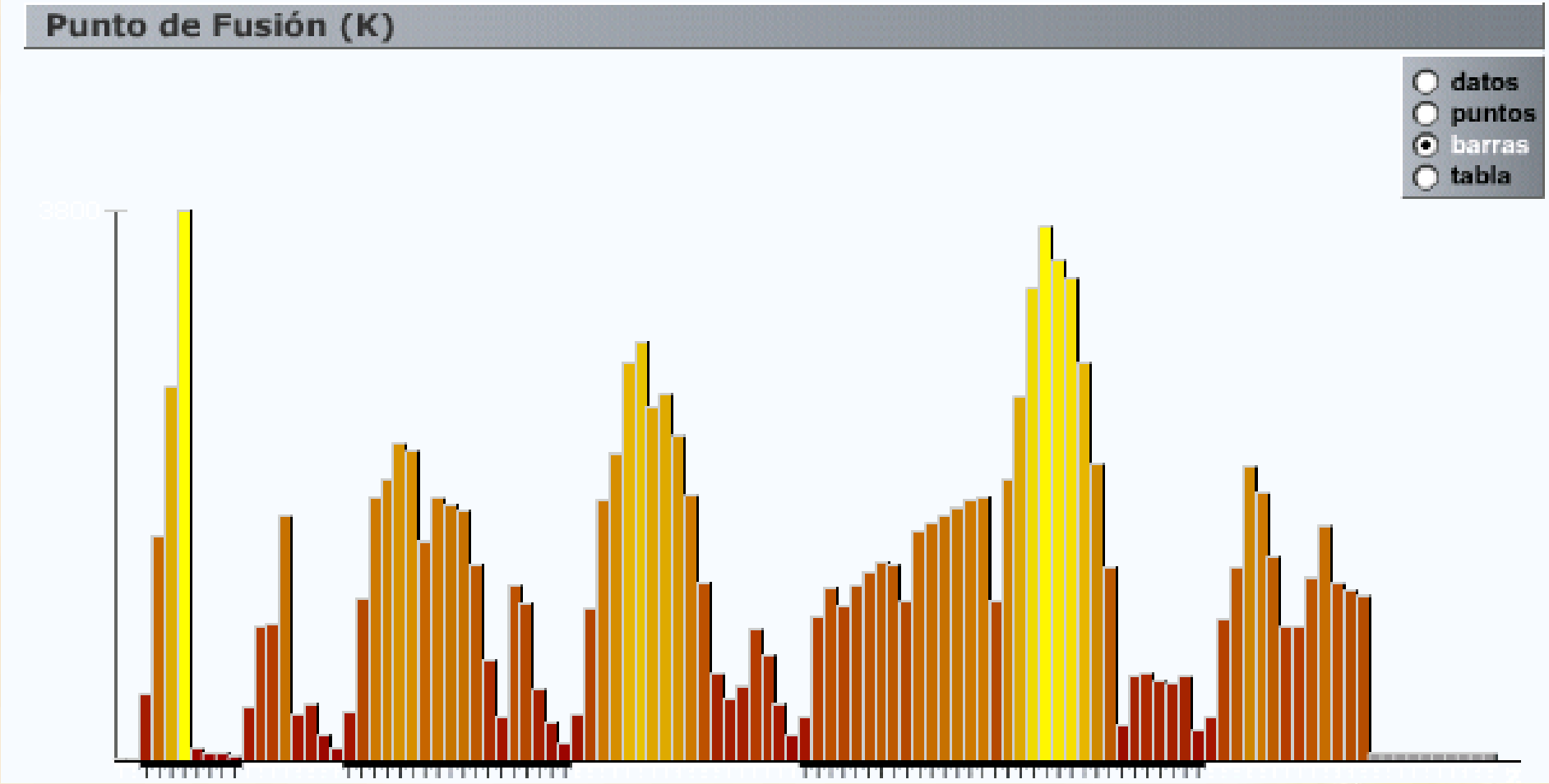

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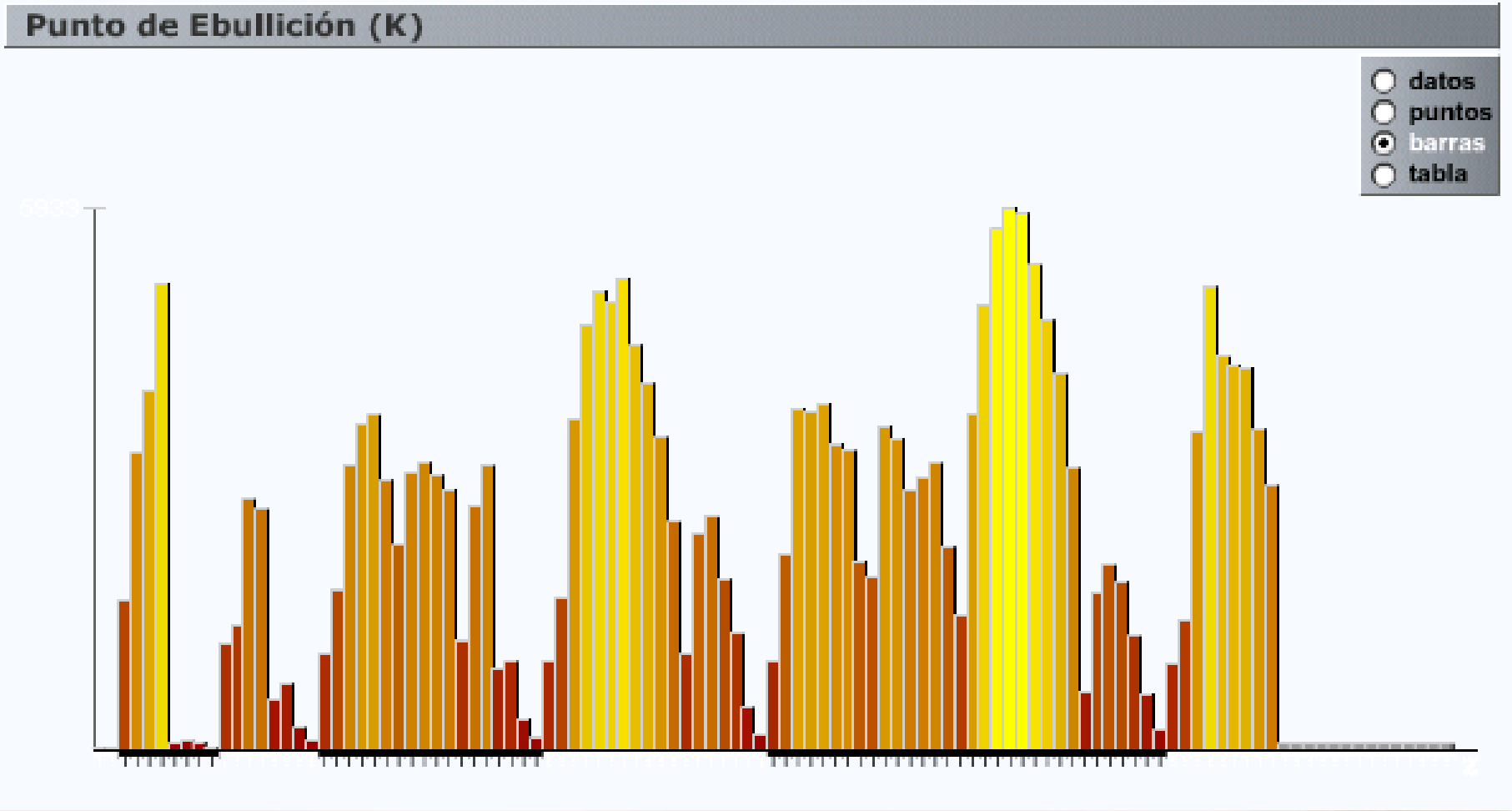

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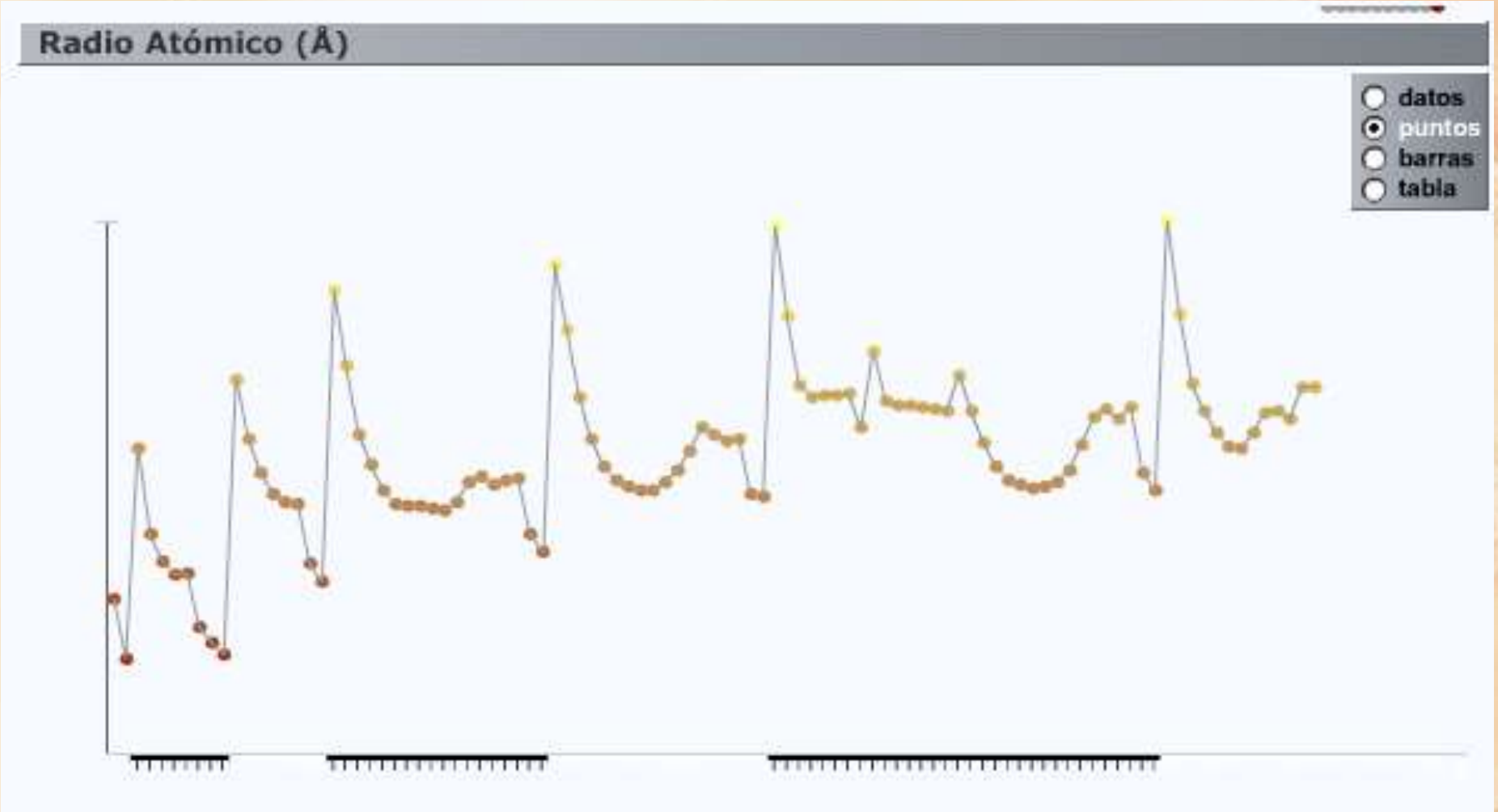

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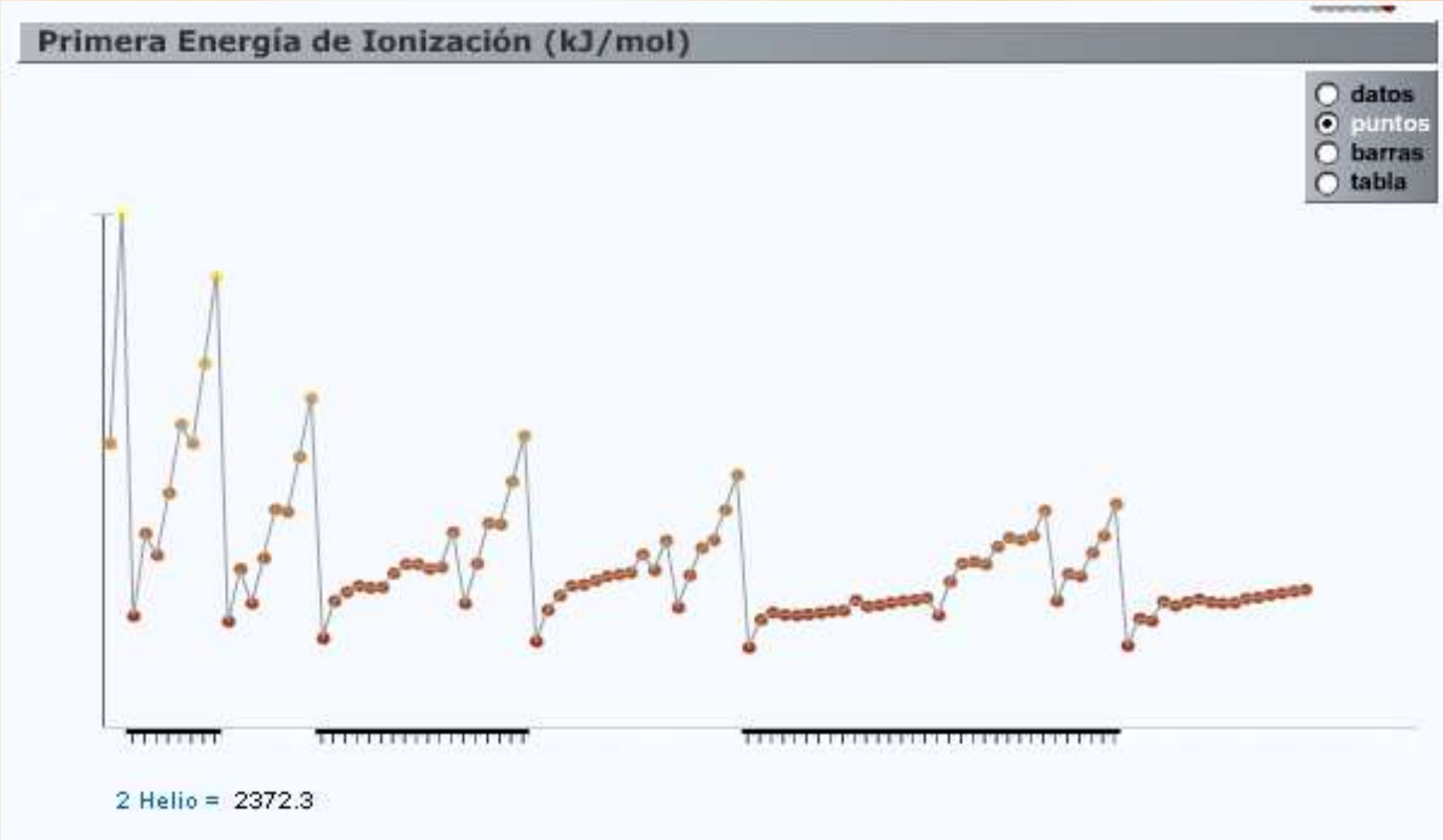

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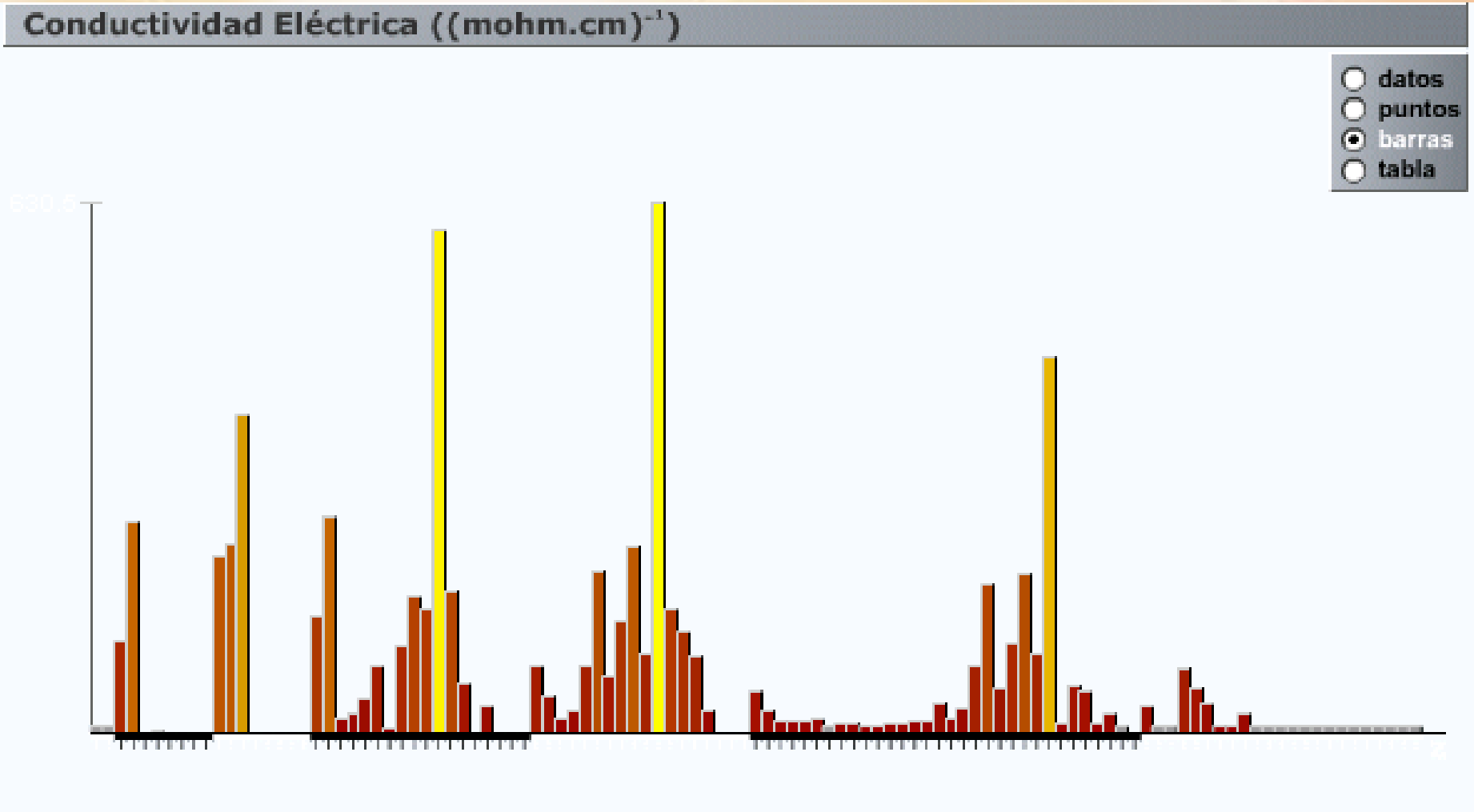
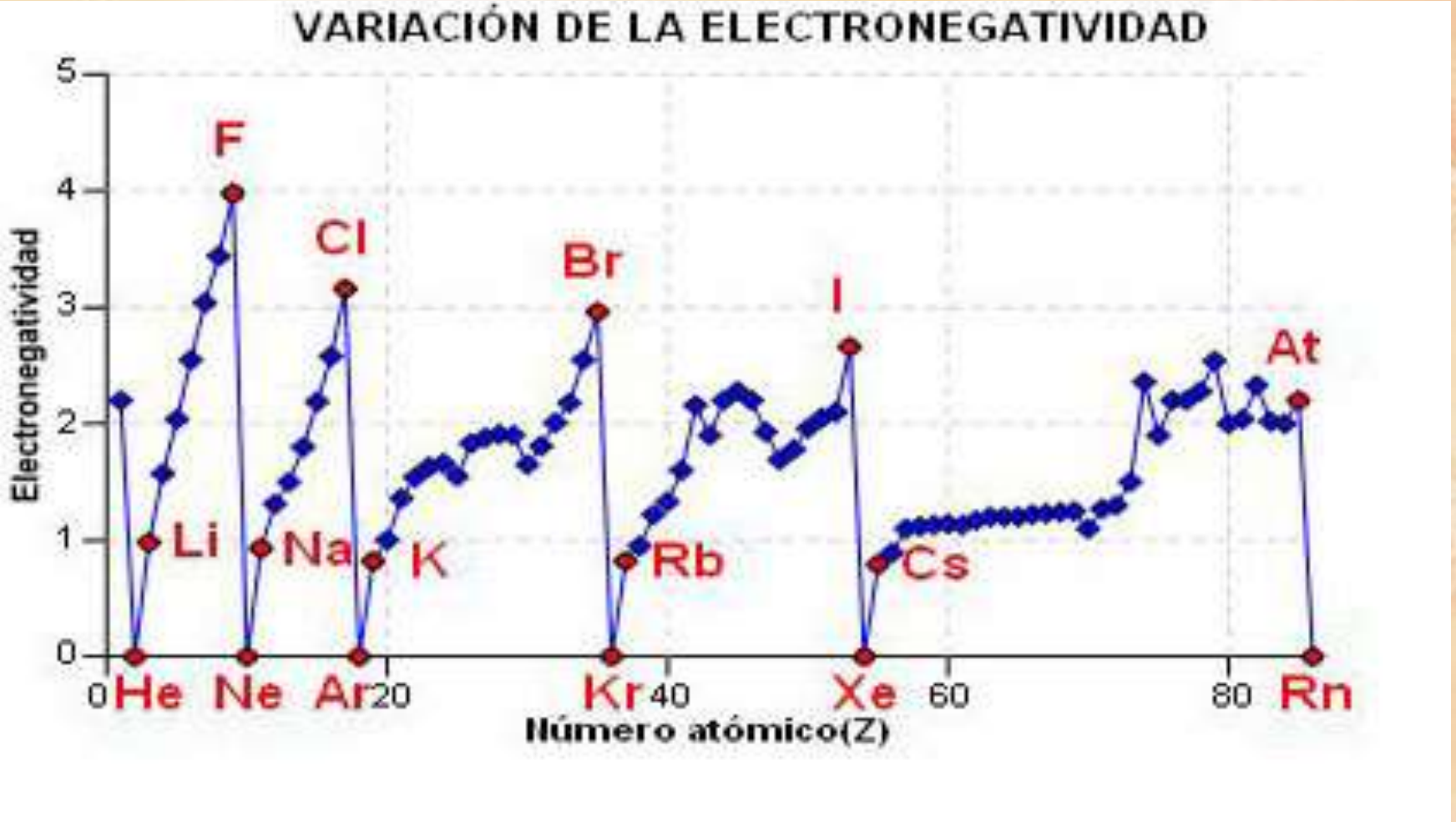


Electronegatividad de Pauling



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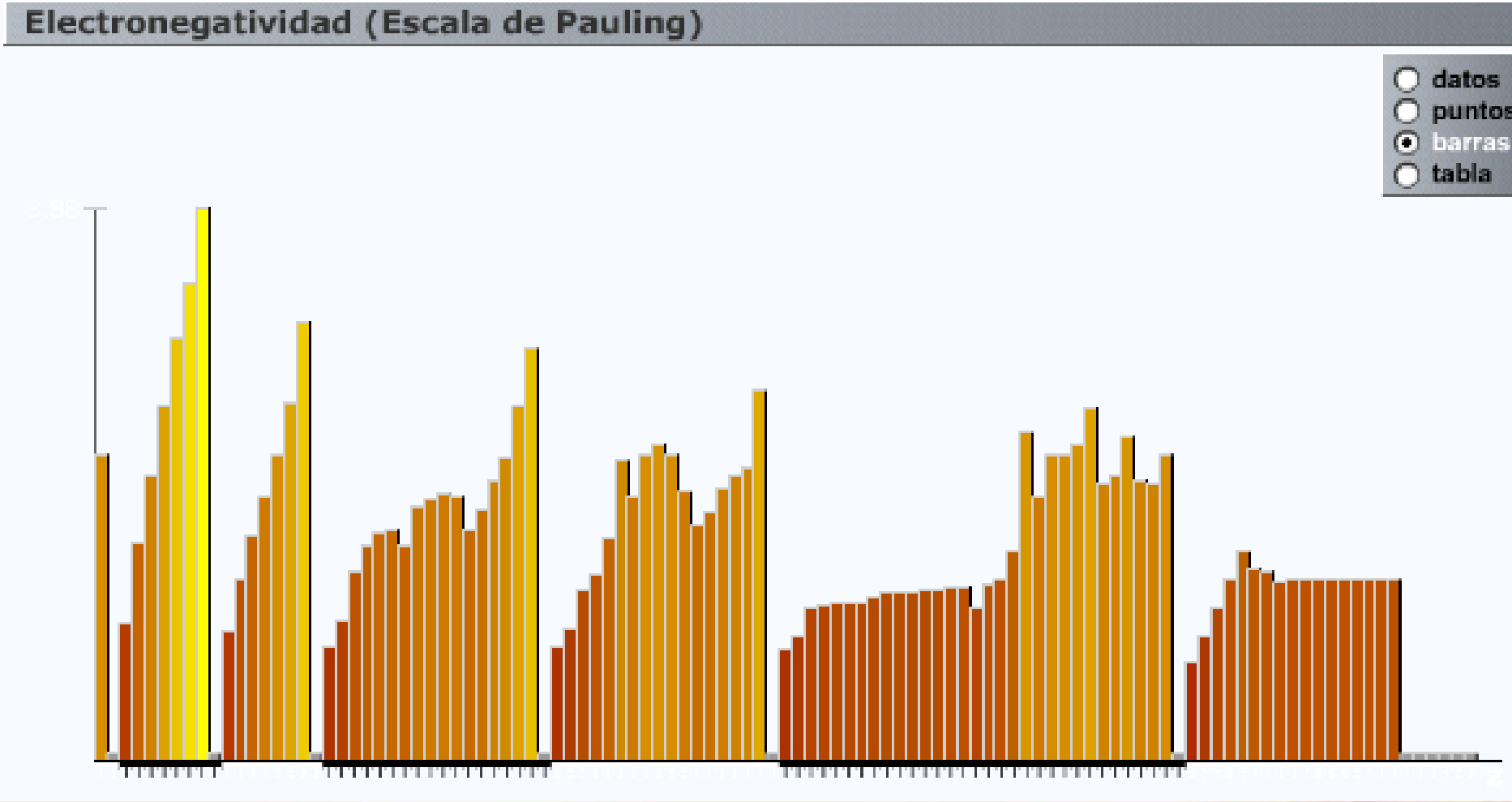

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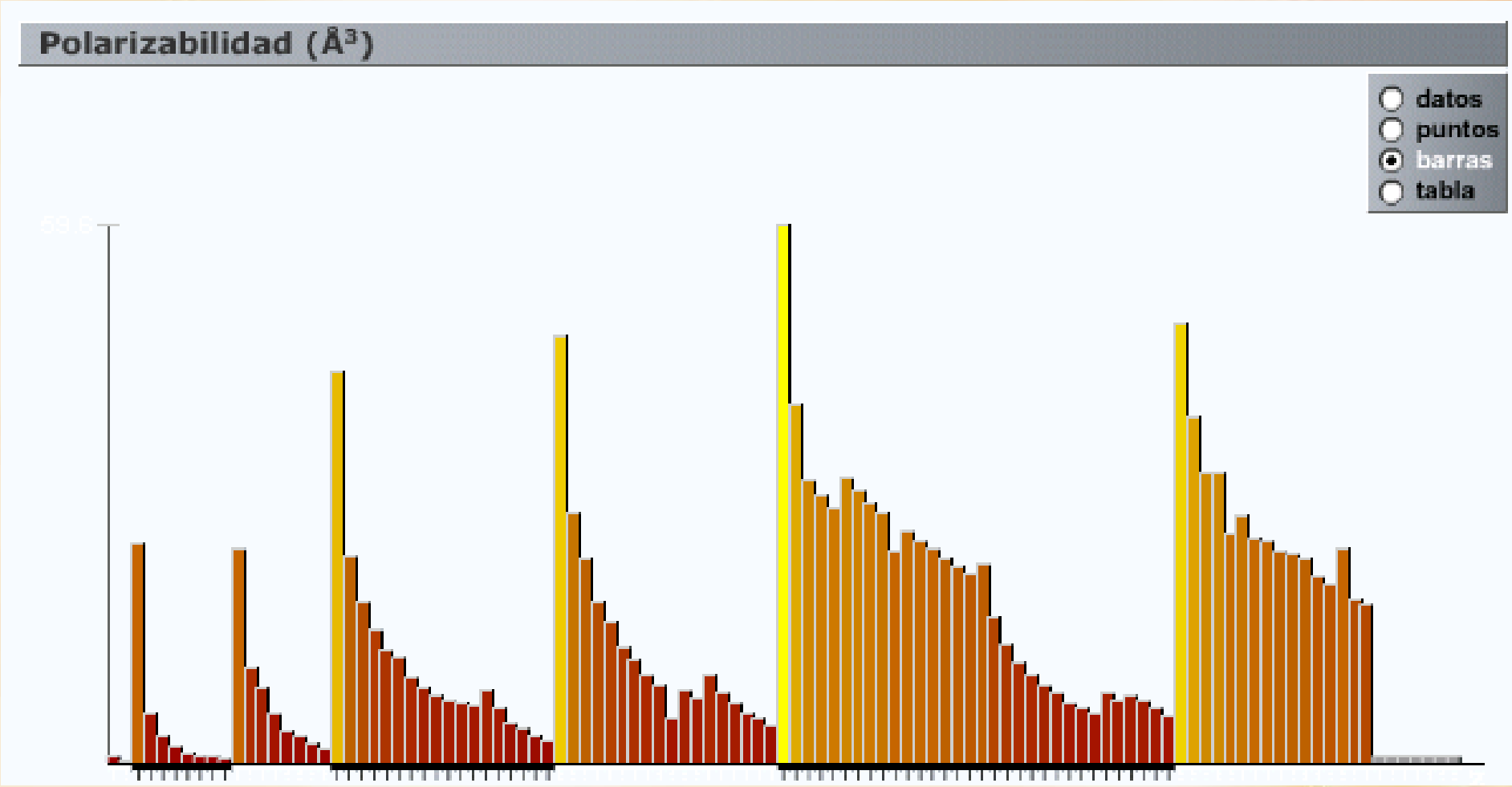

http://www.pbslearningmedia.org/asset/lsps07_int_graphperiodic/

http://www.meta-synthesis.com/webbook/35_pt/pt_database.php?PT_id=194

Tabla periódica

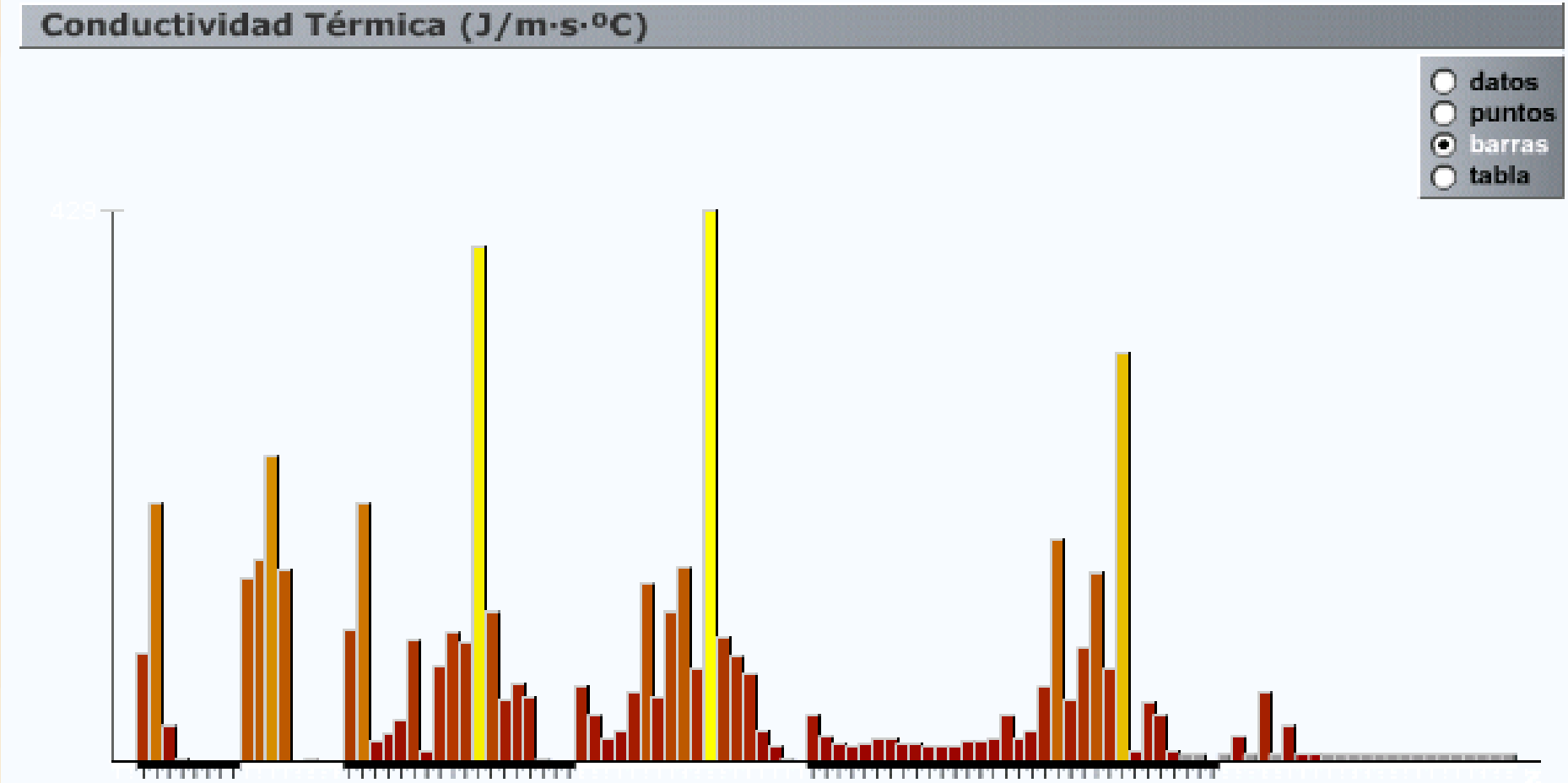

Tabla periódica

Hay una cantidad gigante de material es fácil perderse en un mar de información. Es importante tener localizados los lugares que sistematicen mejor la información.

http://www.chemistrycoach.com/periodic_tables.htm