



Universidad Nacional Autónoma de México



Facultad de Química

Tabla periódica

¿Periodicidad?

Jesús Gracia Mora

Temario

CLASIFICACIÓN PERIÓDICA DE LOS ELEMENTOS.

2.1 Estructura del átomo.

2.2 Partículas subatómicas: electrones, protones, neutrones.

2.3 Antecedentes históricos de la clasificación periódica: tabla de

Döbereiner, Newlands, Mendeleiev, Moseley.

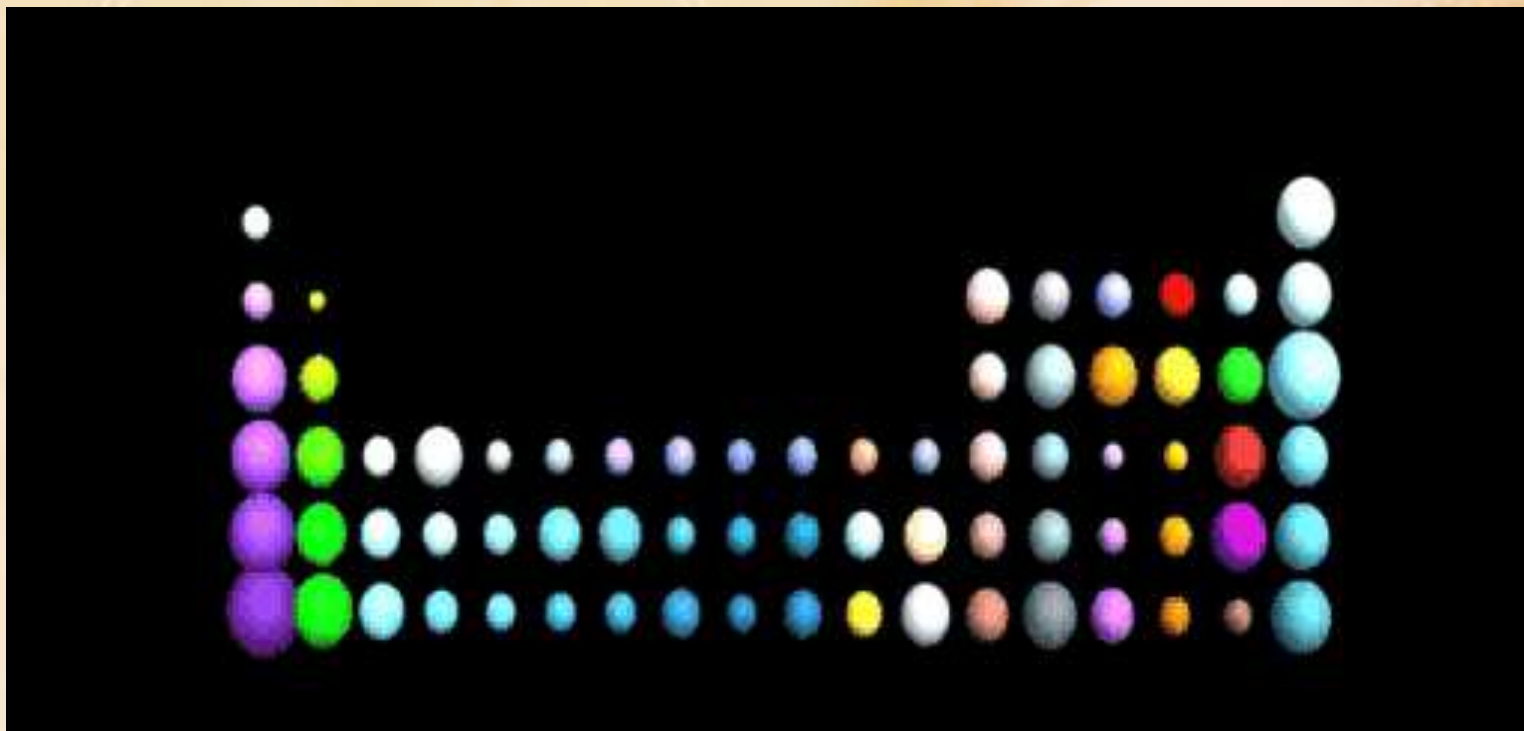
2.4 Ley periódica en función de: masas atómicas, números atómicos y configuraciones electrónicas.

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 asocia más comúnmente la química, se le ha considerado la piedra roseta de la naturaleza.



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Estructura del átomo

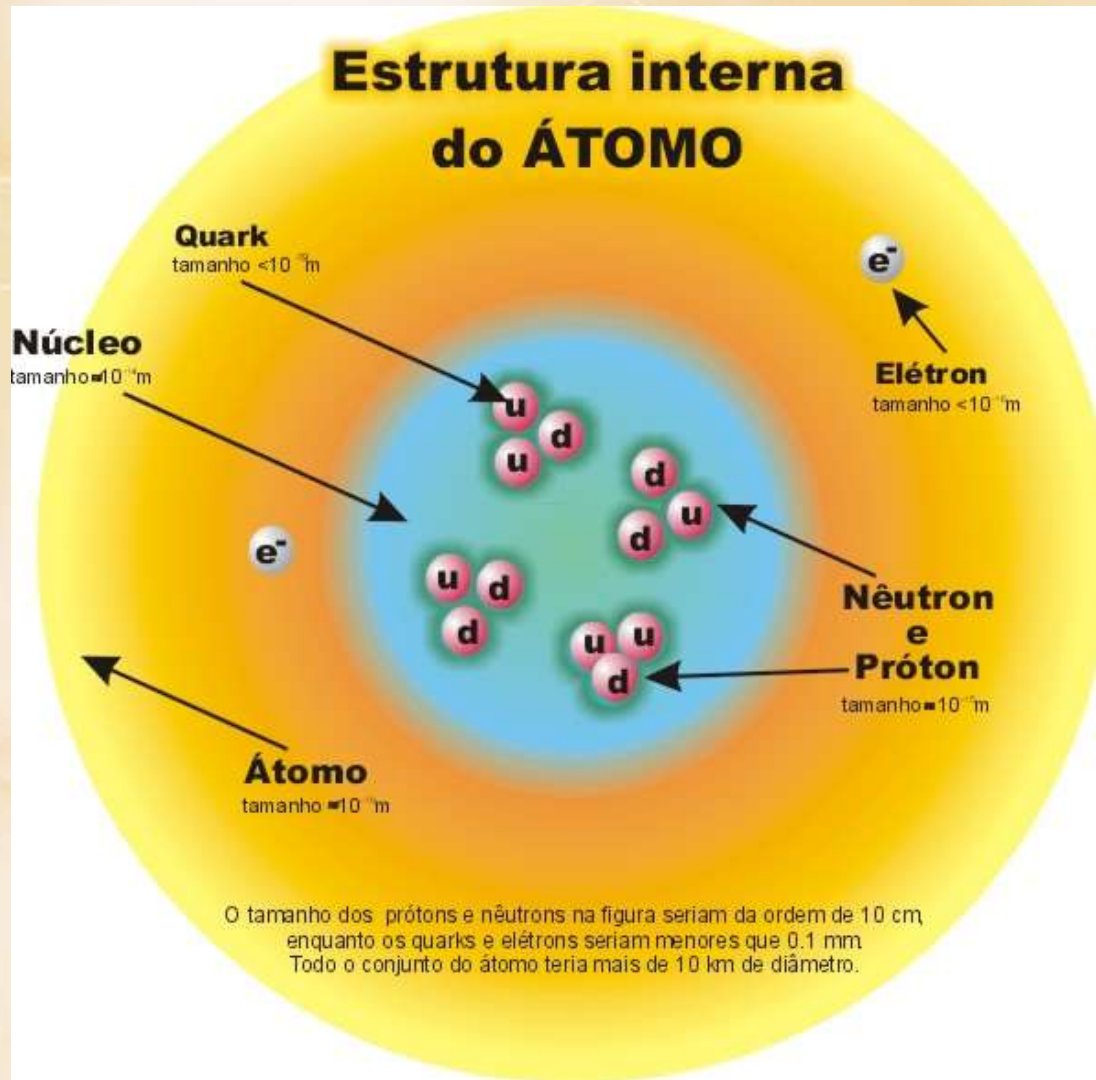


Tabla periódica

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.



Tabla periódica

Un poco de historia



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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. Wollaston 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 Wolfgang 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 daba 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



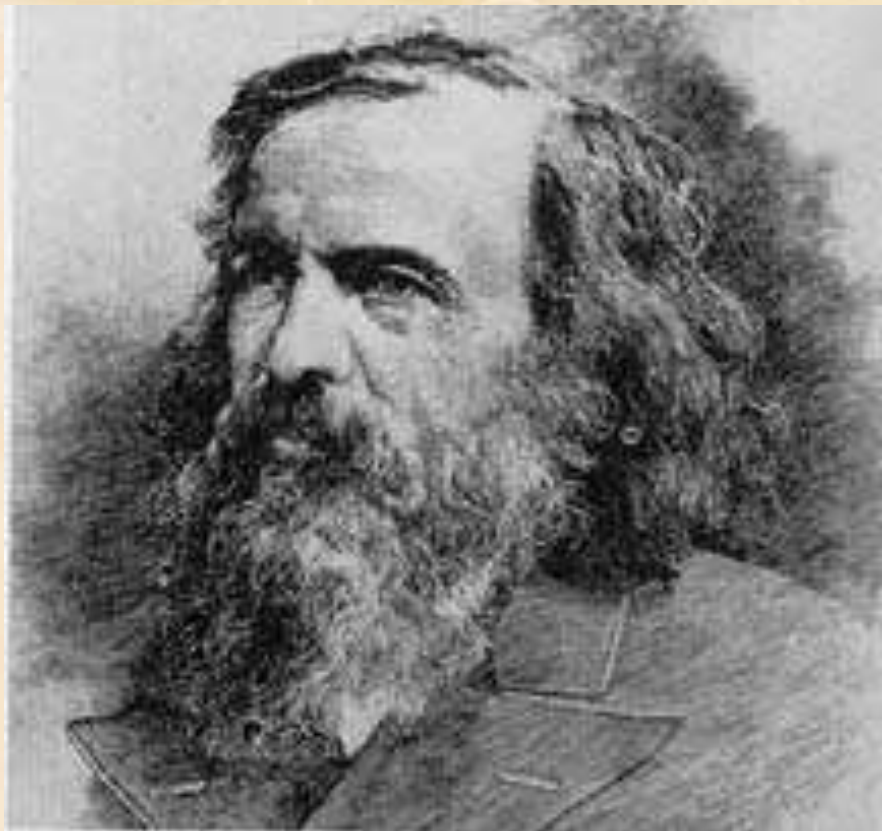
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Tabla periódica

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

НИ ЕСТЬ ОНЪ ДРУГЪ КЛЮЧЕЦЪ, УКО ОНЪ ВЪЗНАКАЕТСЯ ВЪЗРАЖЕНІЕМЪ ЕМУ
 СТАВЛЯЕМУЮ ИМЕНЕ СЕБЕЛЪ ВО ИМЪ ОБЪЯВЛЯЮЩЕГО ЗАКОНЪТА, КЪ
 ВЪЗРАЖЕНІЮ КЛАССОВЪ СЪ ВЪЗРАЖЕНІЕМЪ. ИЪ ЭТОТА РАТА КЪ ИМЕНЕ
 ВЪЗРАЖЕНІЕМЪ КЛАССЪ ОБЪЕДЪ СЪСТАВЪ ЗАКОНЪТА. ПОТЪ ЭТОТЪ
 ЧЕНЪ.

		Гі=50	Зі=50	І=150
		У=51	Ні=54	Ті=197
		Сі=52	Кі=54	W=154
		Мі=55	Рі=104	Рі=197
		Гі=56	Ві=104	І=197
		Ні=Сі=58	Рі=104	Оі=197
		Сі=63	Аі=109	Кі=200
Н=1	Ві=9	Хі=24	Зі=65	Сі=112
	Ві=11	Аі=27	Гі=68	Кі=116
	Сі=17	Ні=28	І=70	Сі=118
	Мі=24	Рі=31	Аі=75	Ві=122
	Оі=24	Сі=32	Ві=78	Ті=127
	Уі=28	Оі=35	Зі=80	І=127
К=1	На=23	Кі=39	Ві=85	Сі=133
		Сі=40	Сі=87	Ві=137
		І=45	Сі=93	
		Ті=54	І=94	
		Уі=60	Оі=95	
		Кі=70	Ті=107	

в какомъ примѣненіи въ разнѣхъ разнѣхъ мѣстахъ различно, различно различно,
 какъ это въ примѣненіи различно различно различно. Какъ въ примѣненіи различно
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Отъ имени *Семени Александровича*
 основанной на *Копенгагенской* (1869)
Д. Менделѣевъ.

Гі=50 *Зі=90* *І=180*
У=51 *Мі=94* *Ті=182*
Сі=52 *Кі=96* *W=186*
Мі=55 *Рі=104* *Рі=197*
Гі=56 *Ві=104* *І=197*
Ні=Сі=58 *Рі=104* *Оі=197*
Сі=63 *Аі=109* *Кі=200*
Н=1 *Ві=9* *Хі=22* *Сі=63* *Аі=104* *Кі=200*
~~Н=1~~ *Ві=9* *Хі=24* *Зі=65* *Сі=112* *Кі=200*
Н=1 *Ві=11* *Мі=22* *І=68* *Ві=116* *Кі=197*?
70 *І=118* *Ві=210*?
75 *І=122* *Ві=210*?
80 *І=127* *Ві=210*?
85 *Аі=133* *Кі=204*
87 *Ві=137* *Рі=207*
92
94
95
98

18 $\frac{II}{17}$ 69.

1969
 ПОЧТА СССР 30



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.

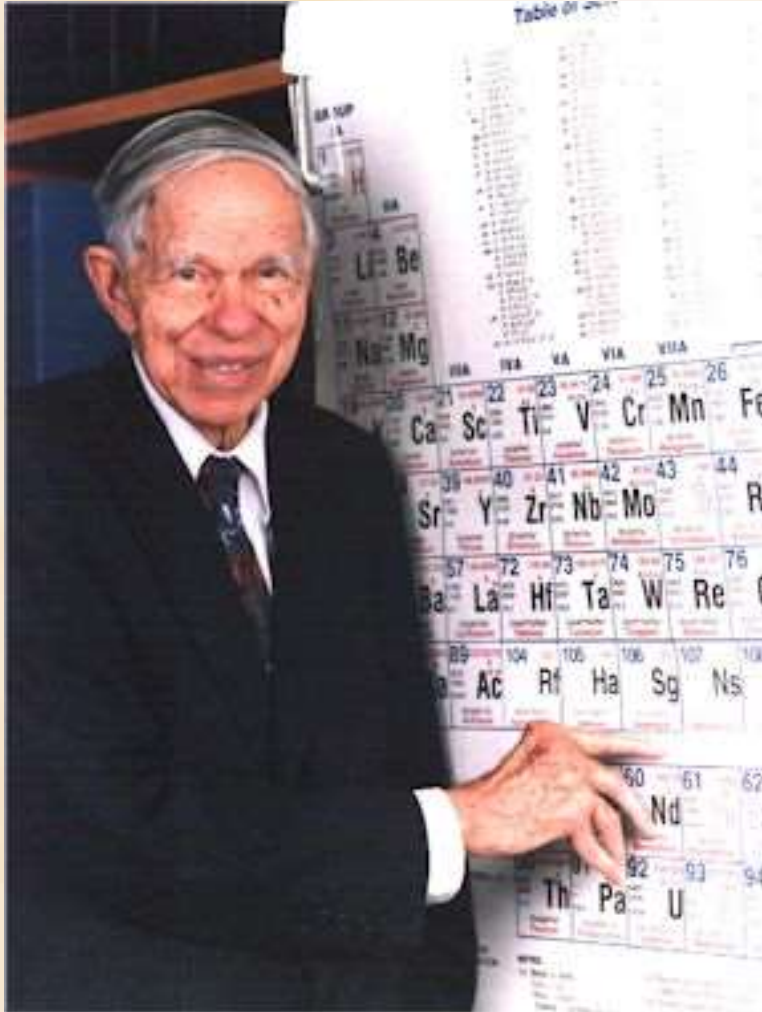
“Las Propiedades de los elementos varían en función de sus números atómicos”



Tabla periódica

Glenn Seaborg

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



s block										d block										p block							
1 1A	2 2A											3 3A	4 4A	5 5A	6 6A	7 7A	8 8A										
3 3s	4											5 5p	6	7	8	9	10										
11 3s	12											13 3p	14	15	16	17	18										
19 4s	20											21 4d	22	23	24	25	26	27	28	29	30	31 4p	32	33	34	35	36
37 5s	38											39 4d	40	41	42	43	44	45	46	47	48	49 5p	50	51	52	53	54
55 6s	56	f block										71 5d	72	73	74	75	76	77	78	79	80	81 6p	82	83	84	85	86
87 7s	88											103 6d	104	105	106	107	108	109	110	111	112	113 7p	114	115	116	117	118



Tabla periódica

1A 1 H Hydrogen 1.00794																	2A 2 He Helium 4.00260
3 Li Lithium 6.941	4 Be Beryllium 9.01218											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.0067	8 O Oxygen 15.9994	9 F Fluorine 18.998403	10 Ne Neon 20.1797
11 Na Sodium 22.98977	12 Mg Magnesium 24.305	3B 3	4B 4	5B 5	6B 6	7B 7	8B 8 9 10			1B 11	2B 12	13 Al Aluminum 26.98154	14 Si Silicon 28.0855	15 P Phosphorus 30.97376	16 S Sulfur 32.066	17 Cl Chlorine 35.4527	18 Ar Argon 39.948
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.9559	22 Ti Titanium 47.88	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.9380	26 Fe Iron 55.847	27 Co Cobalt 58.9332	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.9216	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.9059	40 Zr Zirconium 91.224	41 Nb Niobium 92.9064	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.9055	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.82	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.9045	54 Xe Xenon 131.29
55 Cs Cesium 132.9054	56 Ba Barium 137.327	57 *La Lanthanum 138.9055	72 Hf Hafnium 178.49	73 Ta Tantalum 180.9479	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.9665	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.9804	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)
87 Fr Francium (223)	88 Ra Radium 226.0254	89 †Ac Actinium 227.0278	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (262)	108 Hs Hassium (265)	109 Mt Meitnerium (268)	110 (269)	111 (272)	112 (277)						

*Lanthanide Series	58 Ce Cerium 140.115	59 Pr Praseodymium 140.9077	60 Nd Neodymium 144.24	61 Pm Promethium (145)	62 Sm Samarium 150.36	63 Eu Europium 151.965	64 Gd Gadolinium 157.25	65 Tb Terbium 158.9254	66 Dy Dysprosium 162.50	67 Ho Holmium 164.9303	68 Er Erbium 167.26	69 Tm Thulium 168.9342	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967
† Actinide Series	90 Th Thorium 232.0381	91 Pa Protactinium 231.0359	92 U Uranium 238.0289	93 Np Neptunium 237.048	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (260)





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	Tl 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	(R X ₇) R ₂ O	(R X ₆) R ₂ O ₃	(R X ₅) R ₂ O ₂	R H ₄ R ₂ O ₄	R H ₃ R ₂ O ₃	R H ₂ R ₂ O ₂	R H R ₂ O ₂	(R ₂ H) } Verbindungs- (R ₂ O ₂) } formen
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 Yb?	162 ?	166 Er?	167 ?	? 169 Tm?	
10.	? 170	? 172	Yb 178	? 177	Ta 182	W 184	? 190	Os 193 ⁵⁾ , 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	

⁵⁾ Aus der Dampfdichte des Os O₄ (Deville und Debray, Ann. chim. phys. (3) 56, 476) ergibt sich die Zahl 193 als Atomgewicht des Osmiums.

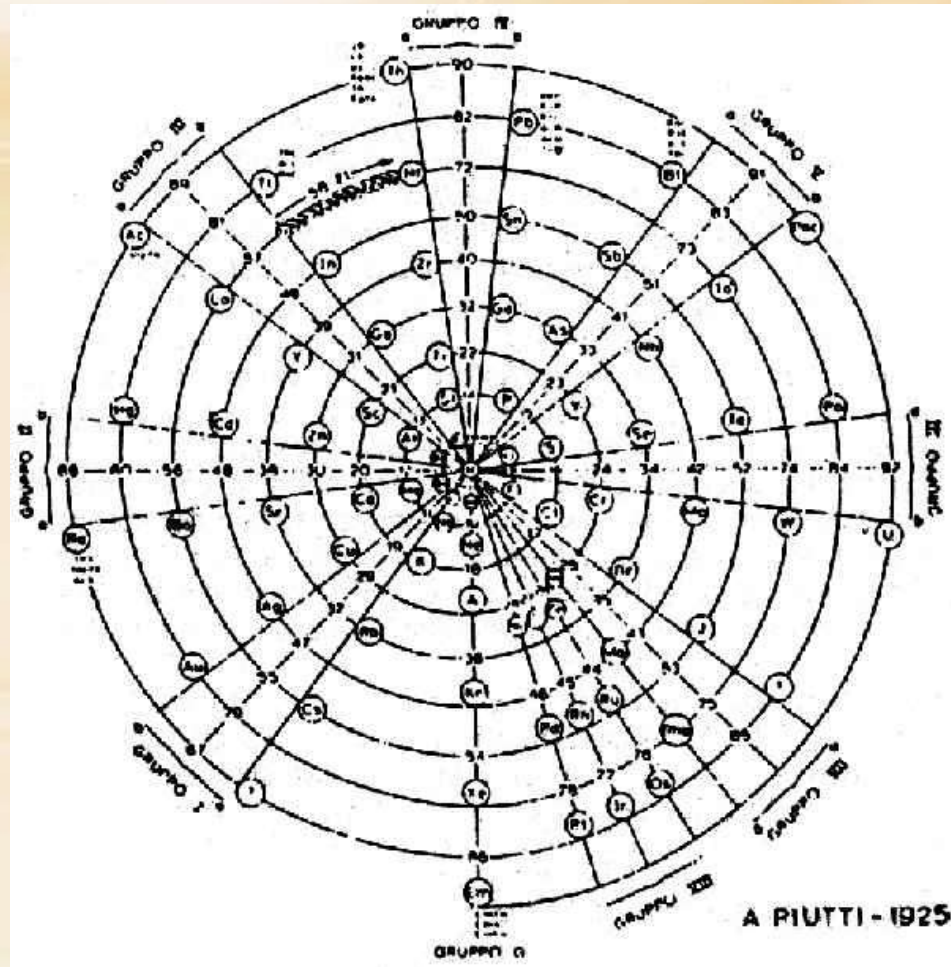




I		Периодическая система алкогольных элементов						VIII							
1	H *							He 16 56							
		II	III	IV	V	VI	VII	ХЕРЕС							
2	Li 21 ЛИКЕР	B 38 БРЕНДИ	K 41 КОНЬЯК	V 40 ВОДКА	W 100 ЦАРСКАЯ ВОДКА	Gr 6 ГРОГ	Sh 10 ШАМПАНСКОЕ	Pt 18 ПОРТВЕЙН							
3	Md 56 МЕДОВУХА	Sc 60 САКЭ	D 29 ДЖИН	Ra 39 РАКИЯ	Pn 45 ПЕРНО	Pu 7 ПУНШ	Bu 2 БУРГУНДСКОЕ	Mn 12 МАРТИНИ	Ve 14 ВЕРМУТ	Kn 13 КЪЯНТИ					
4	Na 11,11 НАЛИВКА	Cu 40,2 ЦУЙКА	P 52 ПЕРЦОВКА	Cl 40,5 КЮММЕЛЬ	Kr 7,5 КРЮШОН	Ga 34 ГРАППА	Kb 8 КАБЕРНЕ	Mu 16,5 МУСКАТ	Bm 15 БУКЕТ МОЛДАВИИ	Tc 17 ТОКАЙ					
5	Rm 42 РОМ	Go 92 ГОРИЛКА	Z 48 ЗУБРОВКА	Ka 8,8 КАЛЬВАДОС	Si 0,8 СИДР	Zl * ЗЕЛЬЕ	Bd 3 БОРДО	Ca 19 КАГОР	Al 0,01 АЛИГОТЕ	Mr 20 МАДЕРА					
6	Te 33 ТЕКИЛА	Ch 63 ЧАЧА	At 31 АБСЕНТ	El 11 ЭЛЬ	Cm 20,5 КРОВАВАЯ МЭРИ	Tb * ТЕЛЕБЕНЧИК	* хрен его знает, что это (спор.) ** шнапс бабы Дзыны *** коктейль по-русски **** виски по-индейски ***** сладкий, когда пьешь задарма ***** от крепости даже челюсти сводит		Kl 5 ПИВО KELLERS - крепость I - калории 1- для таблицы ОПОХМЕЛОИДОВ и ЗАКУСОИДОВ - значение, указываю- щее эффективность данного элемента						
7	Pi 37 ПУЛЬКЕ	Ov * ОГНЕННАЯ ВОДА	Du 22 ДУХИ	Sn 43 САМОГОН	Pr 73 ПЕРВАЧ	Er 29 ЕРШ									
8	Bz 36 БАЛЬЗАМ	S 95 СПИРТ	Ts 96,6 ТЕХ. СПИРТ	Dn 77 ДЕНАТУРАТ	O 26 ОДЕКОЛОН	L 25 ЛОСЬЕН	U * УКСУС	Br 0,1 БРАГА	Bt 0,09 БОРМОТУХА	Fu 0 ПОЙЛО					
ЗАКУСОИДЫ															
Sr 1,1 СЫРОК	Mi 0,7 МИТИТЕМ	Tf 2,2 ТАРАНЬКА	Ir 0,03 ИРИСКА	Bl 0 БЕЛЯШ	Mn 12 МАМАЛЫГА	Pn 1,5 ЖЕВ. РЕЗИНКА	Hr 16 ХРЕН	Re 16 РЕДЬКА	Dr 1 ДУНЬКИНА РАДОСТЬ	Pd 4,4 ПОДОСНОВИК	Ge 7,3 ГЕМАТОГЕН	Ar 0,99 АРБУЗ	Sm 2,4 СЕМЕЧКИ	Cs 4,8 КАЗИНАКИ	Pm 1 ПЕЛЬМЕНИ
ОПОХМЕЛОИДЫ															
Kf 3 КЕФИР	Rs 2,9 РАССОЛ	Ti 0,75 ЧАЙ	Ti * ЧЕФИРЬ	Kv 35 КВАС	Bo 1,6 БОРЩ	Ha 40 ХАРЧО	Ml 0,08 МОЛОКО	Ku 8,8 КУМЫС	Gb 0 ГАЛИА БЛАНКА	Cf 2,8 КОФЕ	Rh 4 РЯЖЕНКА	Ma 5,6 МАРИНАД	Vi 5,6 ВАЛЕРИАНКА	Au 0,00 АСПИРИН УЛІСА	Kc 2,22 КАПЕЛЬНИЦА



Tabla periódica



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Tabelle I.

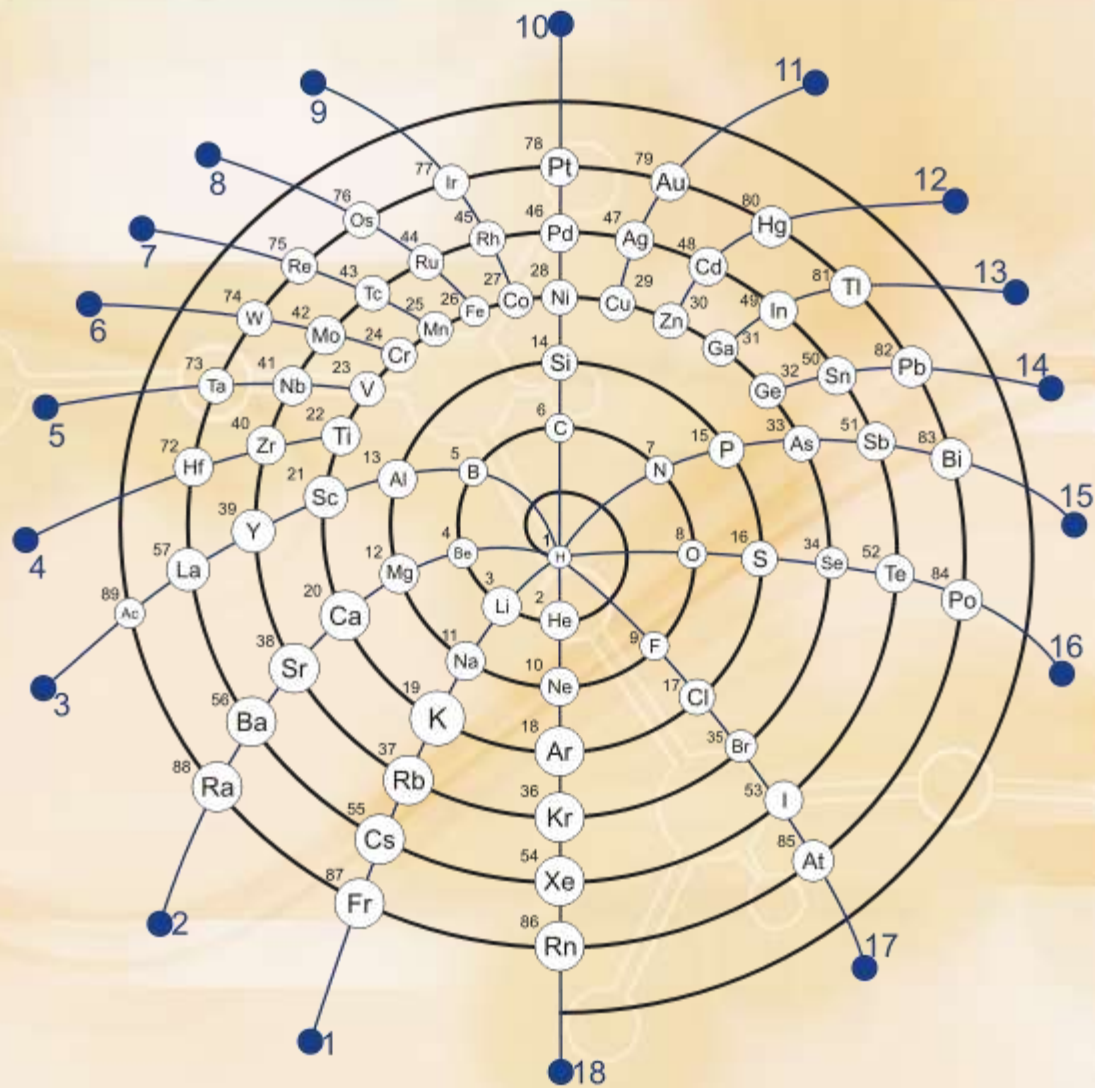
Periodisches System der Elemente.

	I							0
1	H 1.008 1							He 4.00 2
Wertigkeit bez. Gruppennummer	I	II	III	IV	V	VI	VII	0
Symbol	Li	Be	B	C	N	O	F	Ne
Atom-Gewicht	6.94	9.1	11.0	12.0	14.0	16.0	19.0	20.2
Ordnungszahl (Kernladung)	3	4	5	6	7	8	9	10
3	Na 23.0 11	Mg 24.3 12	Al 27.1 13	Si 28.3 14	P 31.0 15	S 32.1 16	Cl 35.5 17	Ar 39.9 18

Die Atomvolumina nehmen von der Mitte nach beiden Seiten zu.

	I	II	III	IV	V	VI	VII	VIII	I	II	III	IV	V	VI	VII	0																																																	
4	K 39.1 19	Ca 40.1 20	Sc 45.1 21	Ti 48.1 22	V 51.0 23	Cr 52.0 24	Mn 54.9 25	Fe 55.8 26	Co 59.0 27	Ni 58.7 28	Cu 63.6 29	Zn 65.4 30	Ga 69.9 31	Ge 72.5 32	As 75.0 33	Se 79.2 34	Br 79.9 35	Kr 82.9 36																																															
5	Rb 85.5 37	Sr 87.6 38	Y 88.7 39	Zr 90.6 40	Nb 93.5 41	Mo 96.0 42	?	Ru 101.7 44	Rh 102.9 45	Pd 106.7 46	Ag 107.9 47	Cd 112.4 48	In 114.8 49	Sn 118.7 50	Sb 120.2 51	Te 127.5 52	I 126.9 53	X 130.2 54																																															
6	Cs 132.8 55	Ba 137.4 56	seltene Erden 139.0 bis 178 57 ^{s. unten} bis 72		Ta 181.5 73	W 184.0 74	?	Os 190.9 76	Jr 193.1 77	Pt 195.2 78	Au 197.2 79	Hg 200.6 80	Tl 204.0 81	Pb 207.2 82	Bi 208.0 83	Po 210 84	?	85	Ern 222 86																																														
7	?	Ra 226.0 88	Ac 89	Th 232.1 90	Bv 234 91	U 238.2 92	<table border="1"> <tr> <td>La</td><td>Ce</td><td>Pr</td><td>Nd</td><td>?</td><td>Sm</td><td>Eu</td><td>Gd</td><td>Tb</td><td>Dy</td><td>Ho</td><td>Er</td><td>Tu I</td><td>Ad</td><td>Cp</td><td>Tu II</td> </tr> <tr> <td>139.0</td><td>140.3</td><td>140.9</td><td>144.3</td><td>?</td><td>150.4</td><td>152.0</td><td>157.3</td><td>158.9</td><td>162.5</td><td>163.5</td><td>167.3</td><td>168.5</td><td>173.5</td><td>175.0</td><td>-</td> </tr> <tr> <td>57</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td><td>71</td><td>72</td> </tr> </table>											La	Ce	Pr	Nd	?	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tu I	Ad	Cp	Tu II	139.0	140.3	140.9	144.3	?	150.4	152.0	157.3	158.9	162.5	163.5	167.3	168.5	173.5	175.0	-	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
La	Ce	Pr	Nd	?	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tu I	Ad	Cp	Tu II																																																		
139.0	140.3	140.9	144.3	?	150.4	152.0	157.3	158.9	162.5	163.5	167.3	168.5	173.5	175.0	-																																																		
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72																																																		





Periodic table: Spiral format by Jan Scholten

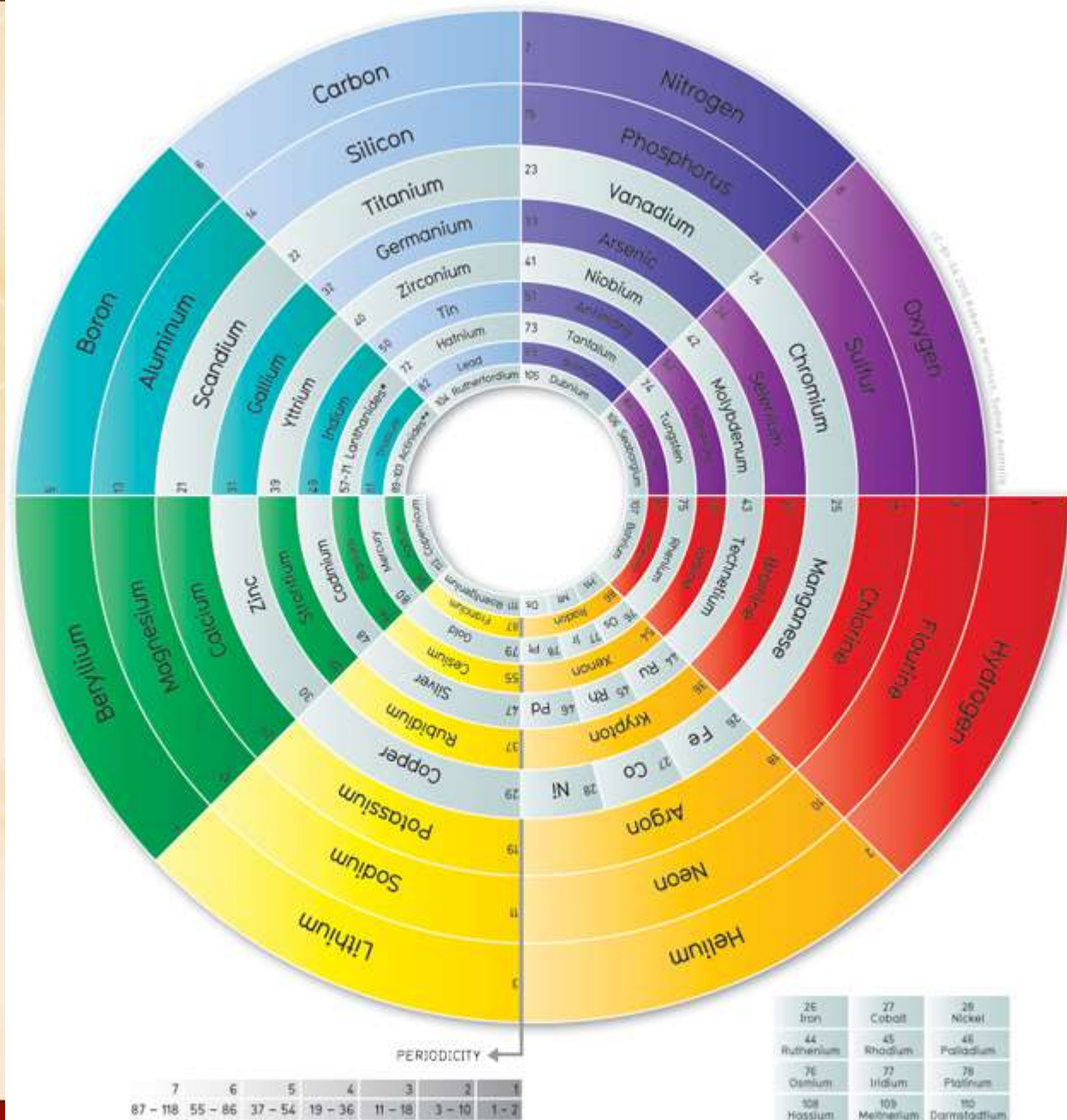




Periodic Table of the Operators

*Every operation of mathematics is like a little game
with its own rules and its own logic. It is
a game of symbols and signs, and the beauty of
mathematics is not only in the results but in the
method of the game itself.*

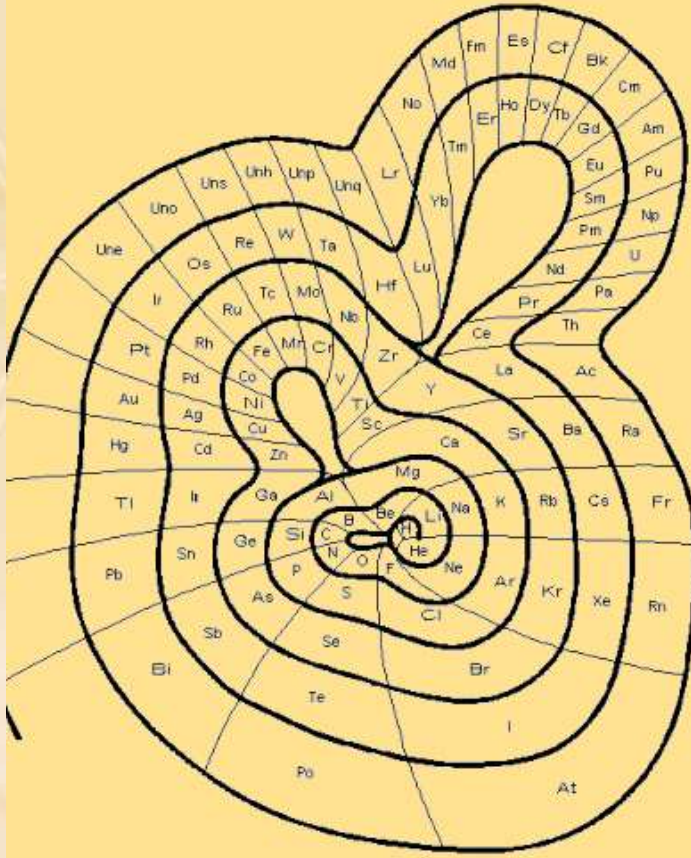




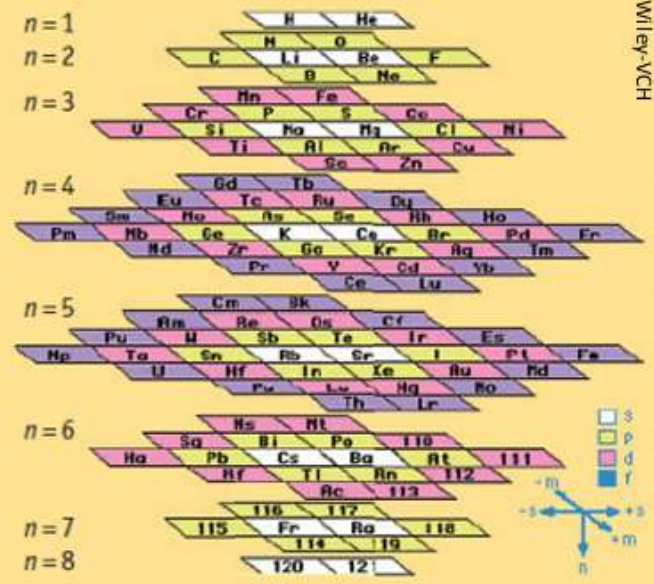
Jesús Gracia Mora



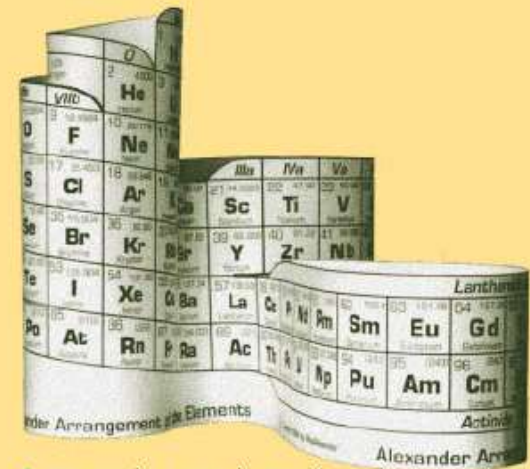
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▲ Fractal periodic system by Melinda Green
(c) Melinda Green



▲ Stepped periodic system by Timothy Stowe



▲ 3D periodic system by Roy Alexander



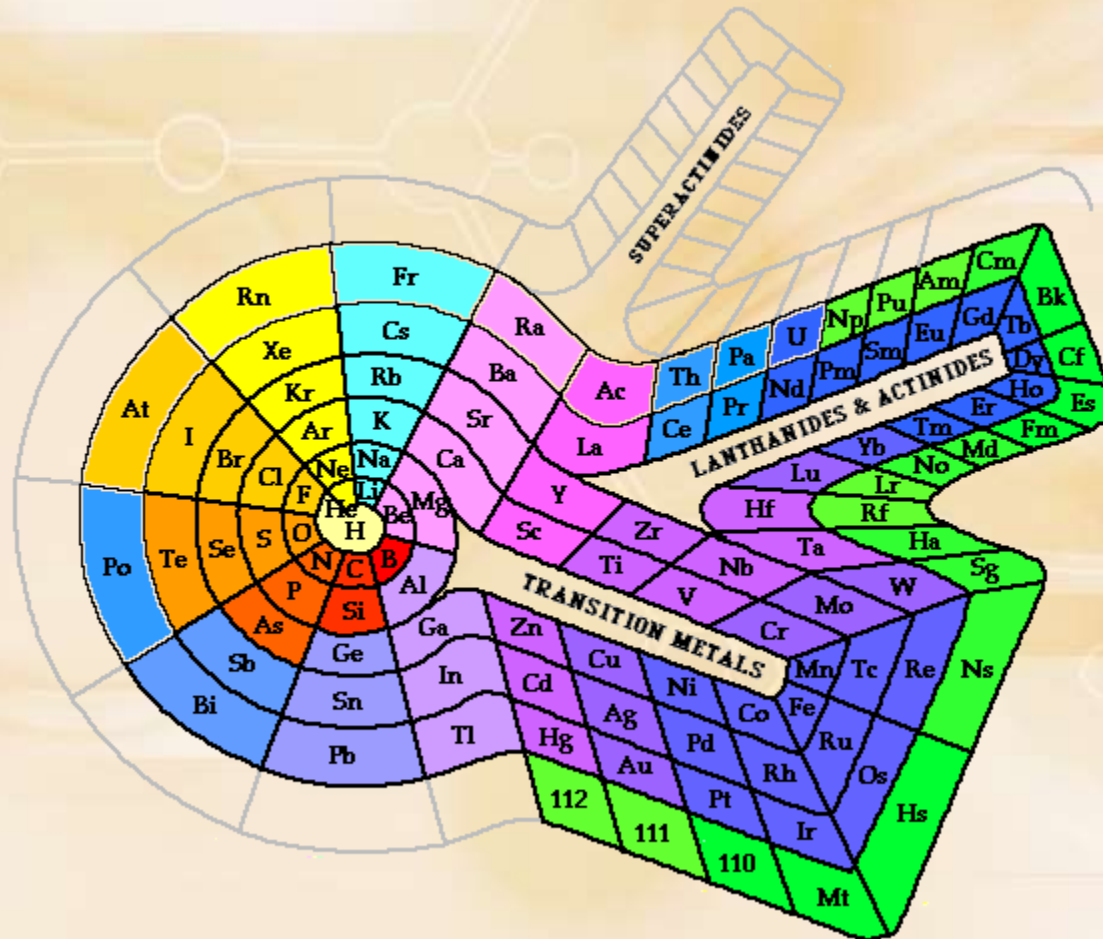
Proton number

Se66 0+	Se67 60 ms ECp	Se68 35.5 s 0+	Se69 27.4 s (3/2-)	Se70 41.1 m 0+	Se71 4.74 m 3/2-, 5/2-	Se72 8.40 d 0+	Se73 7.15 h 9/2+	Se74 0+	Se75 119.779 d 5/2+	Se76 9.36 0+	Se77 7.63 2-	Se78 23.78 0+	Se79 1.3026 y 7/2+	Se80 49.61 4+
As65 0.39 s EC	As66 93.77 ms EC	As67 42.5 s (5/2-)	As68 151.6 s 3+	As69 15.2 m 5/2-	As70 52.6 m 4+	As71 48.28 h 5/2-	As72 26.0 h 2-	As73 50.30 d 3/2-	As74 17.77 d 2-	As75 100 3/2+	As76 13078 d 1/2+	As77 38.83 h 3/2-	As78 90.7 m 2-	As79 9.01 m 3/2-
Ge64 63.7 s 0+	Ge65 30.9 s (3/2-)	Ge66 2.26 h 0+	Ge67 18.9 m 1/2-	Ge68 270.8 d 0+	Ge69 39.05 h 5/2-	Ge70 0+	Ge71 11.43 d 2+	Ge72 0+	Ge73 0+	Ge74 35.94 0+	Ge75 85.78 m 2-	Ge76 0+	Ge77 11.30 h 7/2+	Ge78 88.0 m 0+
Ga63 32.4 s 3/2-, 5/2-	Ga64 2.627 m 0+	Ga65 15.2 m 3/2-	Ga66 9.49 h 0+	Ga67 3.2612 d 3/2-	Ga68 67.629 m 1+	Ga69 60.108 3/2-	Ga70 23.14 m EC, β	Ga71 30.892 β	Ga72 14.10 h +	Ga73 4.86 h 3/2-	Ga74 8.12 m (3-)	Ga75 124 s 3/2-	Ga76 32.6 s (2+, 3+)	Ga77 13.2 s (3/2-)
Zn62 9.186 h 0+	Zn63 38.47 m 3/2-	Zn64 0+	Zn65 244.26 d 5/2-	Zn66 0+	Zn67 0+	Zn68 18.8 β	Zn69 5.4 m 0+	Zn70 1.714 y 0+	Zn71 2.45 m +	Zn72 46.5 h 0+	Zn73 23.5 s (1/2-)	Zn74 95.6 s 0+	Zn75 10.2 s (7/2)	Zn76 5.7 s 0+
Cu61 3.33 h 3/2-	Cu62 9.74 m 1+	Cu63 69.17 3/2-	Cu64 18.7 m 1+	Cu65 30.83 β	Cu66 3089 m 1+	Cu67 41.83 h 3/2-	Cu68 31.1 s 3+	Cu69 2.85 m 3/2-	Cu70 4.5 s (1+)	Cu71 19.5 s (3/2)	Cu72 4.6 s (1+)	Cu73 3.9 s β	Cu74 1.504 s (1+, 3+)	Cu75 1.234 s β
Ni60 26.223 0+	Ni61 1.140 3/2-	Ni62 3.634 0+	Ni63 108.1 y 4/2-	Ni64 0.926 β	Ni65 28172 h β	Ni66 54.0 h 0+	Ni67 21 s (1/2)	Ni68 19 s 0+	Ni69 11.4 s β	Ni70 0+	Ni71 1.86 s β	Ni72 2.1 s 0+	Ni73 0.90 s β	Ni74 1.1 s 0+

Neutron number



Tabla periódica



Jesús Gracia Mora



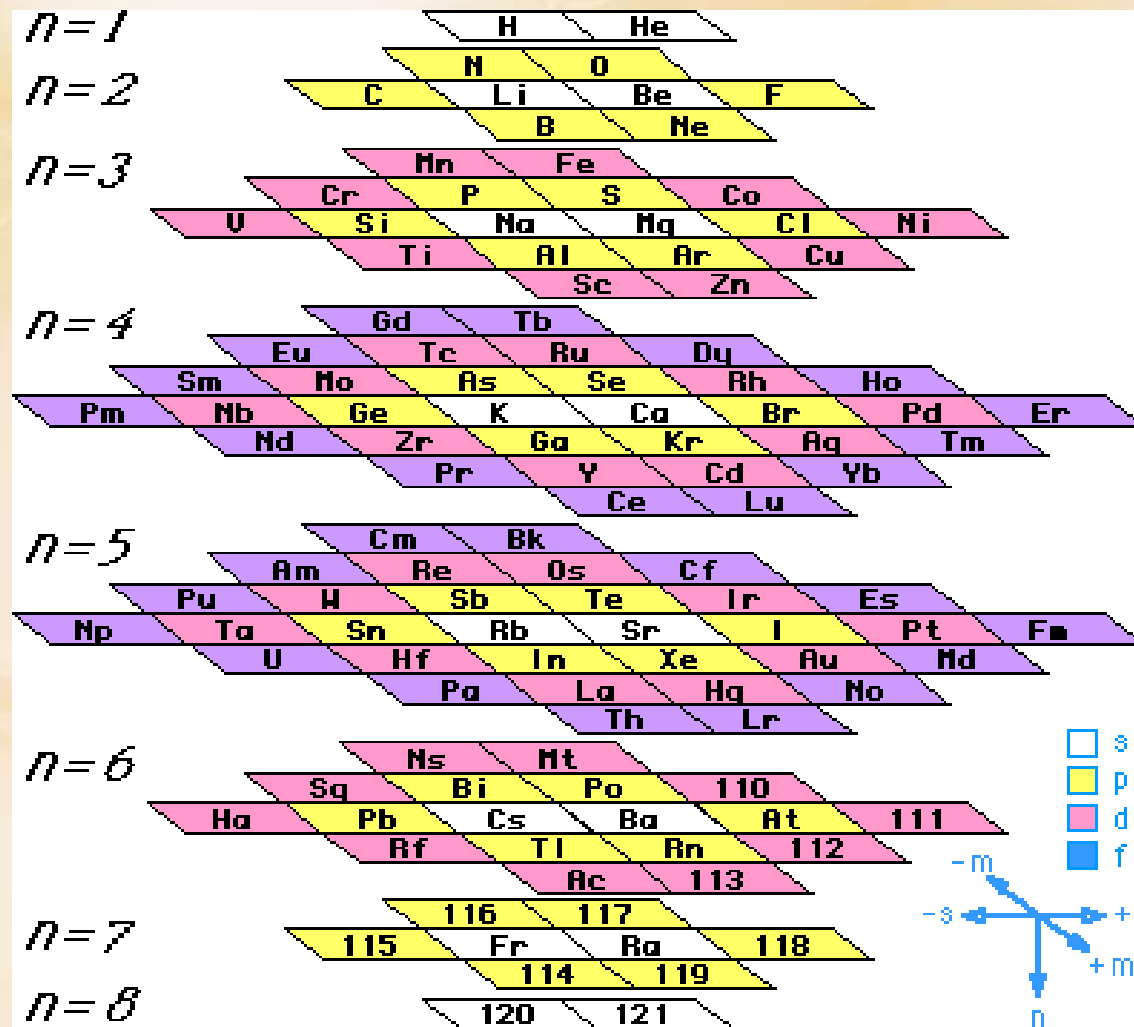
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Tabla periódica

																		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 X	111 X	112 X	113 X	114 X	115 X	116 X	117 X	118 X	119 X	120 X				
138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170			



Tabla periódica



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Tabla periódica

Fr	$7s^2$	$5f^{14}$	$6d^{10}$	$7p^6$?
Cs	$6s^2$	$4f^{14}$	$5d^{10}$	$6p^6$	Rn
Rb	$5s^2$	$4d^{10}$	$5p^6$		Xe
K	$4s^2$	$3d^{10}$	$4p^6$		Kr
Na		$3s^2$	$3p^6$		Ar
Li		$2s^2$	$2p^6$		Ne
H		$1s^2$			He

Jesús Gracia Mora



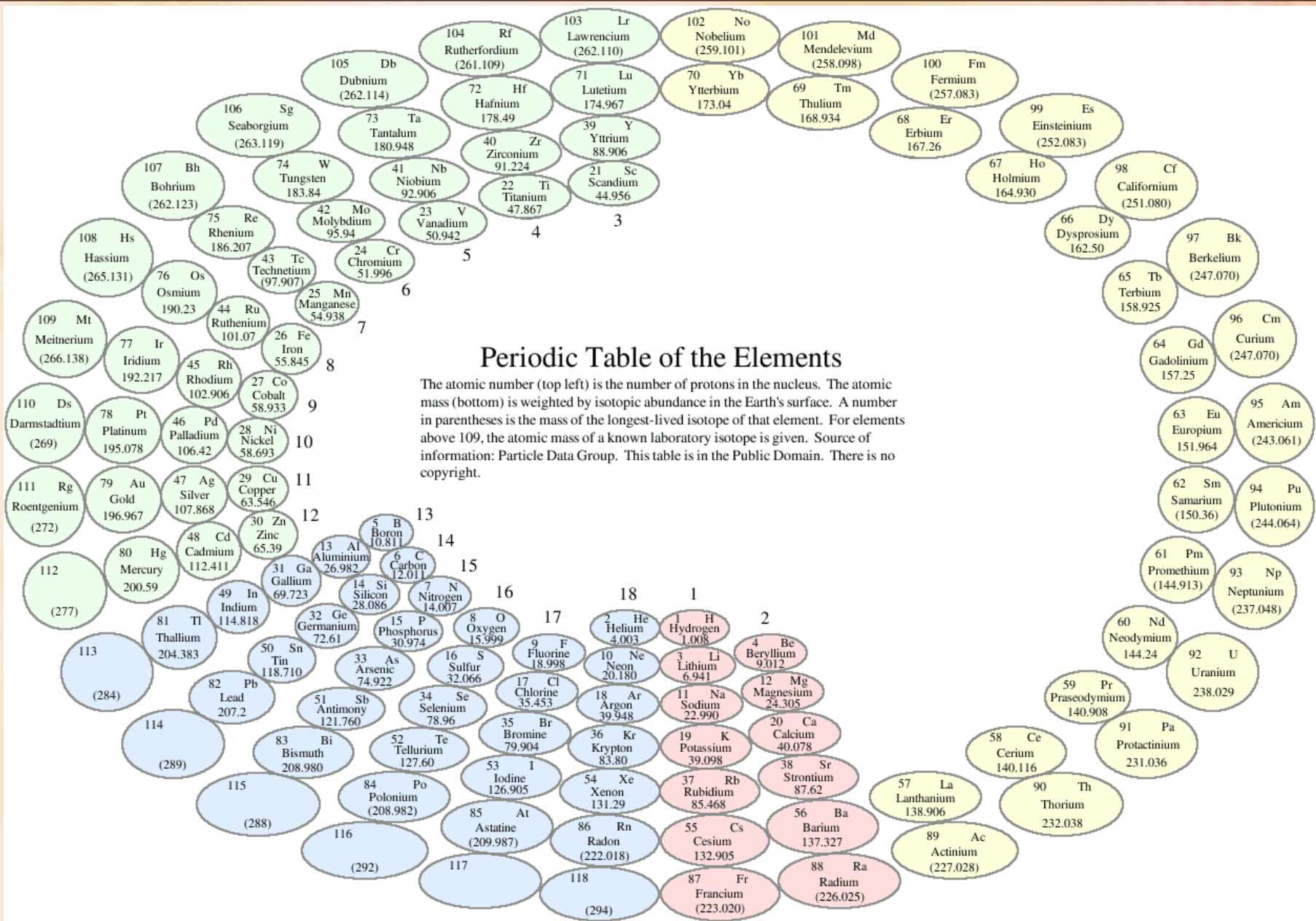
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Tabla periódica

The diagram shows the periodic table elements arranged in a triangular pattern. Purple lines connect the elements in a way that highlights the periodicity of their properties. The elements are listed as follows:

H He	
Li Be	B C N O F Ne
Na Mg	Al Si P S Cl Ar
K Ca Sc	Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr
Rb Sr Y	Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe
Cs Ba La	Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn
Fr Ra Ac	Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr Rf Ha Sg Nh Hs Mt 110 111 112

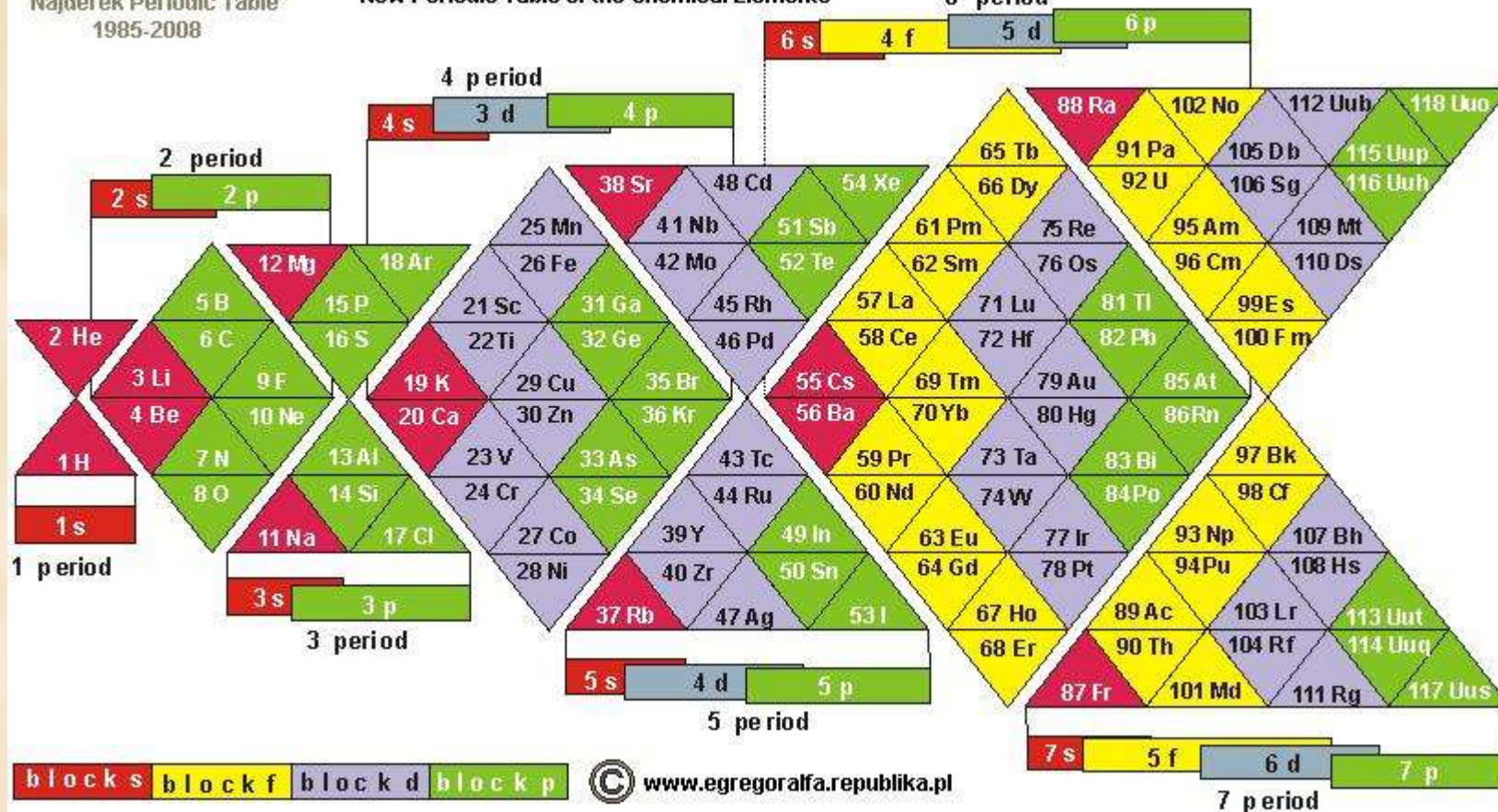


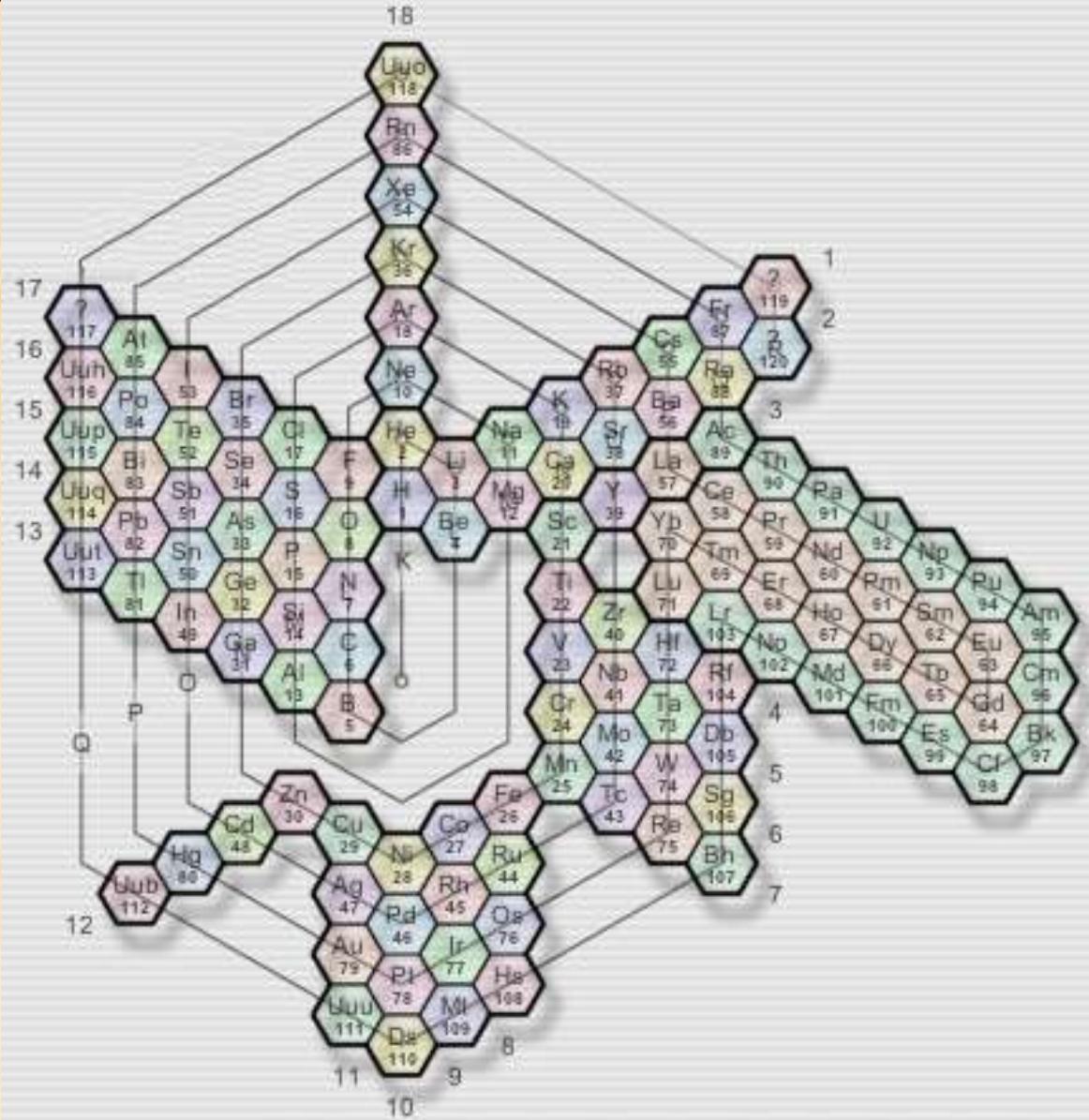


Najderek Periodic Table
1985-2008

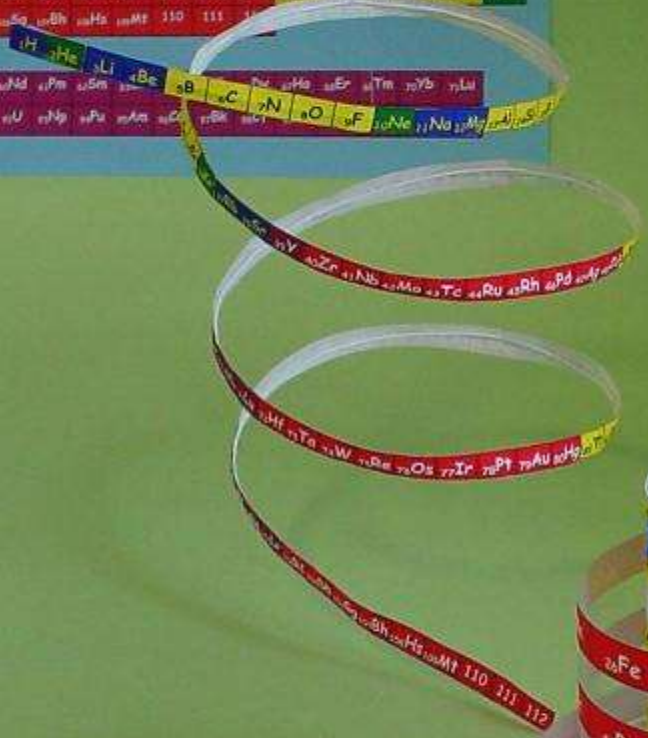
New Periodic Table of the Chemical Elements

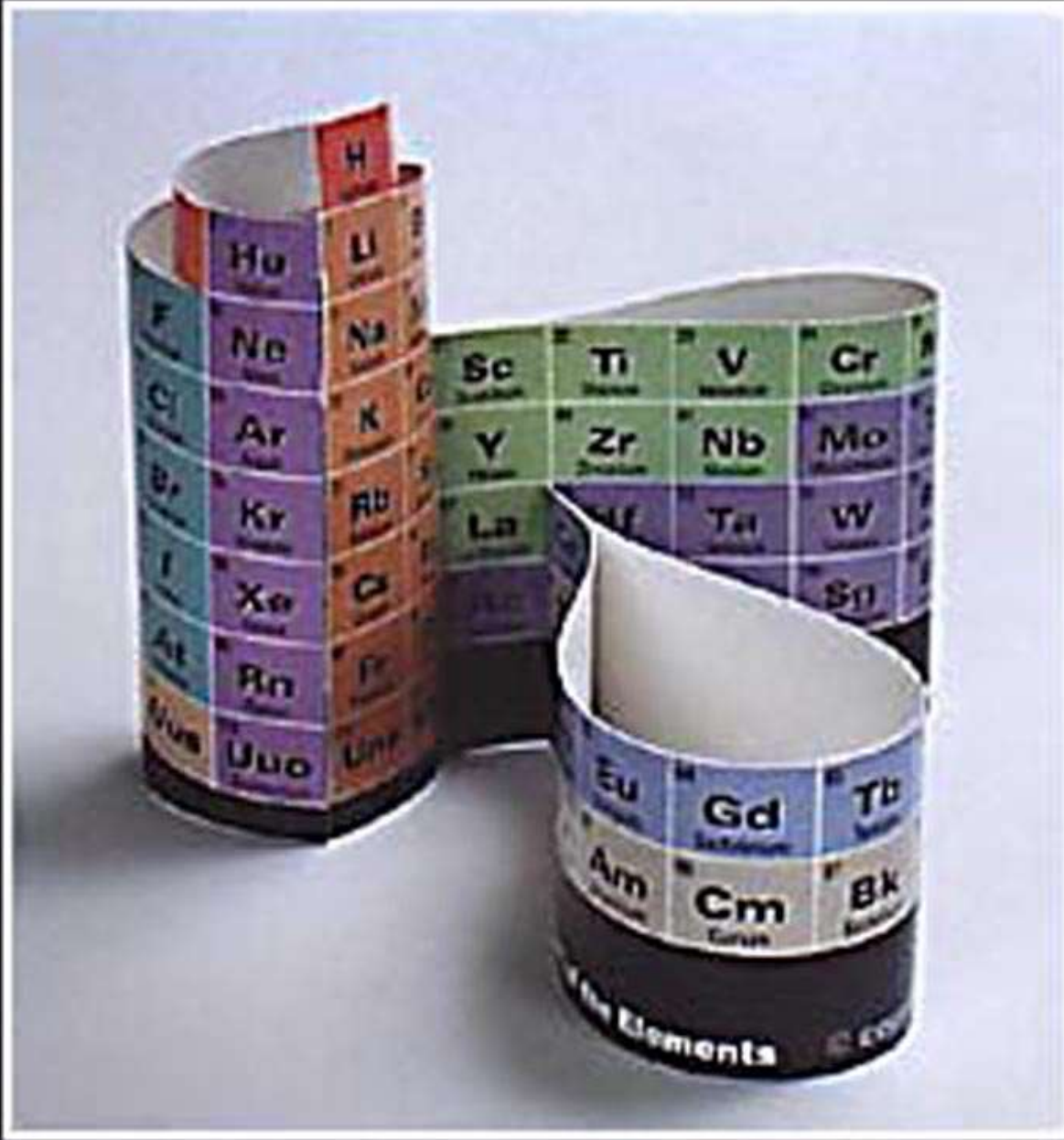
6 period





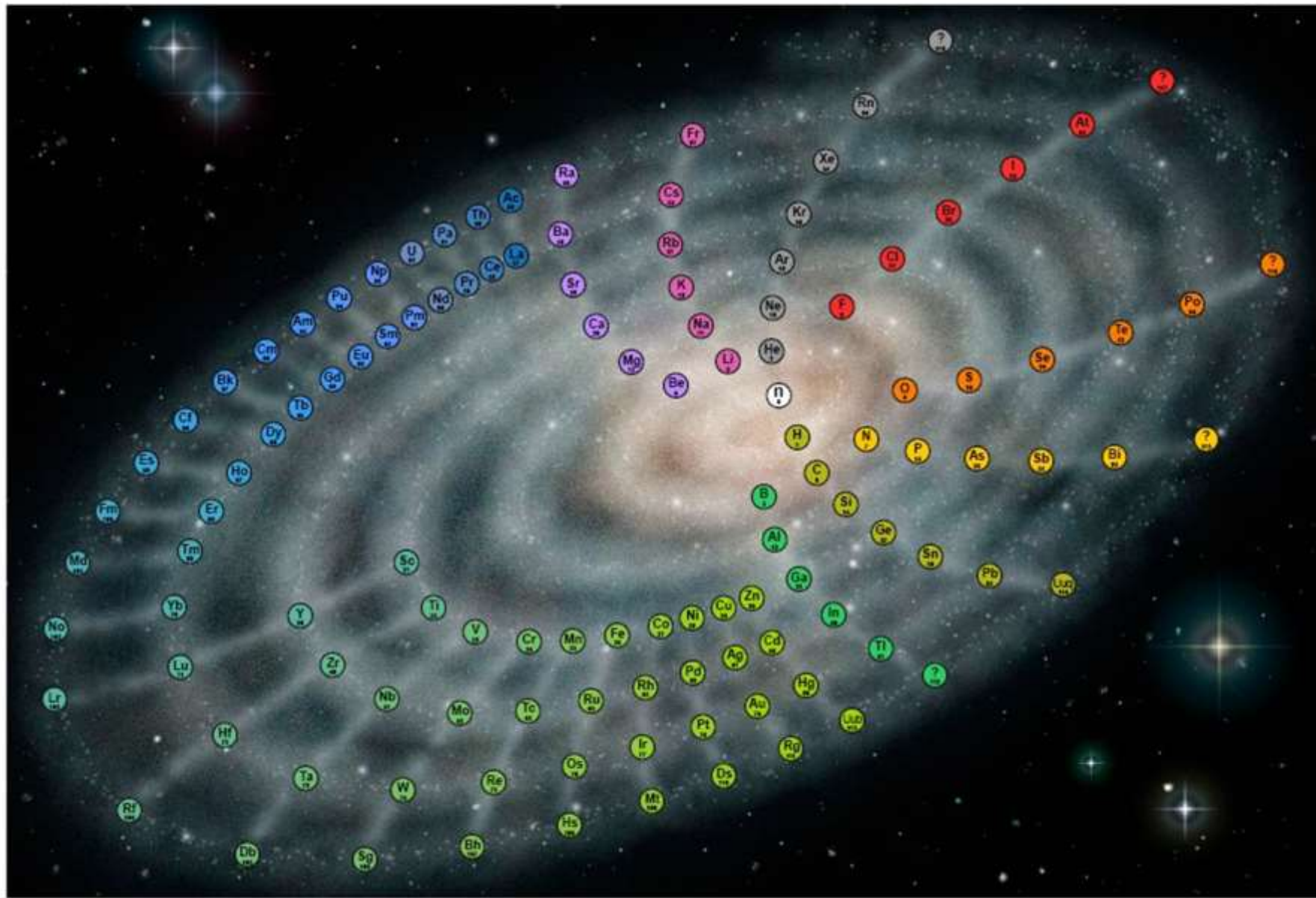
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1H												3B	4C	5N	6O	7F	8He
3Li	4Be											13Al	14Si	15P	16S	17Cl	18Ar
19K	20Ca	21Sc	22Ti	23V	24Cr	25Mn	26Fe	27Co	28Ni	29Cu	30Zn	31Ga	32Ge	33As	34Se	35Br	36Kr
39Rb	40Sr	41Y	42Zr	43Nb	44Mo	45Tc	46Ru	47Rh	48Pd	49Ag	50Cd	51In	52Sn	53Sb	54Te	55I	56Xe
57Cs	58Ba	59-71La	72Hf	73Ta	74W	75Re	76Os	77Ir	78Pt	79Au	80Hg	81Tl	82Pb	83Bi	84Po	85At	86Rn
87Fr	88Ra	89-103Ac	104Rf	105Db	106Sg	107Bh	108Hs	109Mt	110	111	112	113	114	115	116	117	118
119La	120Ce	121Pr	122Nd	123Pm	124Sm	125Eu	126Gd	127Tb	128Dy	129Ho	130Er	131Tm	132Yb	133Lu			
134Ac	135Th	136Pa	137U	138Np	139Pu	140Am	141Cm	142Bk	143Cf	144Es	145Fm	146Md	147No	148Lr			





CHEMICAL GALAXY

A NEW VISION OF THE PERIODIC TABLE OF THE ELEMENTS



Element	Symbol	Atomic Number
Hydrogen	H	1
Helium	He	2
Lithium	Li	3
Beryllium	Be	4
Boron	B	5
Carbon	C	6
Nitrogen	N	7
Oxygen	O	8
Fluorine	F	9
Neon	Ne	10
Sodium	Na	11
Magnesium	Mg	12
Aluminum	Al	13
Silicon	Si	14
Phosphorus	P	15
Sulfur	S	16
Chlorine	Cl	17
Argon	Ar	18
Potassium	K	19
Calcium	Ca	20
Scandium	Sc	21
Titanium	Ti	22
Vanadium	V	23
Chromium	Cr	24
Manganese	Mn	25
Iron	Fe	26
Cobalt	Co	27
Nickel	Ni	28
Copper	Cu	29
Zinc	Zn	30
Gallium	Ga	31
Germanium	Ge	32
Arsenic	As	33
Selenium	Se	34
Bromine	Br	35
Krypton	Kr	36
Rubidium	Rb	37
Strontium	Sr	38
Yttrium	Y	39
Zirconium	Zr	40
Niobium	Nb	41
Molybdenum	Mo	42
Technetium	Tc	43
Ruthenium	Ru	44
Rhodium	Rh	45
Palladium	Pd	46
Silver	Ag	47
Cadmium	Cd	48
Indium	In	49
Tin	Sn	50
Antimony	Sb	51
Tellurium	Te	52
Iodine	I	53
Xenon	Xe	54
Cesium	Cs	55
Barium	Ba	56
Lanthanum	La	57
Cerium	Ce	58
Praseodymium	Pr	59
Neodymium	Nd	60
Europium	Eu	61
Gadolinium	Gd	62
Terbium	Tb	63
Dysprosium	Dy	64
Ho	65	
Erbium	Er	66
Thulium	Tm	67
Ytterbium	Yb	68
Lutetium	Lu	69
Hafnium	Hf	70
Tantalum	Ta	71
W	72	
Rhenium	Re	73
Osmium	Os	74
Iridium	Ir	75
Platinum	Pt	76
Gold	Au	77
Mercury	Hg	78
Thallium	Tl	79
Lead	Pb	80
Bismuth	Bi	81
Polonium	Po	82
Astatine	At	83
Radon	Rn	84
Francium	Fr	85
Radium	Ra	86
Actinium	Ac	87
Thorium	Th	88
Protactinium	Pa	89
Uranium	U	90
Np	91	
Pu	92	
Am	93	
Cm	94	
Bk	95	
Cf	96	
Es	97	
Fm	98	
Md	99	
No	100	
Lr	101	
Rf	102	
Db	103	
Sg	104	
Bh	105	
Hs	106	
Mt	107	
Ds	108	
Rg	109	
Cn	110	
Fl	111	
Lv	112	
Uu	113	
Uub	114	
Uut	115	
Uuq	116	
Uup	117	
Uuq	118	
Og	118	

A vertical representation of the periodic table, showing columns of elements arranged from left to right. The elements are displayed on a black background with a horizontal reflection line. The columns are color-coded: the leftmost column (Group 1) is blue; the second column (Group 2) is light blue; the lanthanide and actinide series are shown as thin red vertical bars; the transition metal block (Groups 3-10) is red; the zinc group (Group 11) is dark red; the tin and lead groups (Groups 12-13) are yellow; the pnictogens and chalcogens (Groups 14-16) are gold; the halogens (Group 17) are yellow-orange; and the noble gases (Group 18) are yellow.

H	He												
Li	Ne												
Na	Ar												
K	Kr												
Rb	Xe												
Cs	Rn												
Fr	Uub												
Be	B												
Mg	Al												
Ca	Ga												
Sc	In												
Y	Tl												
Lu	Pb												
La	Bi												
Ti	Po												
Zr	At												
Hf	Uus												
Rf													
V	Cr	Mn	Fe	Co	Ni	Cu	Zn	B	C	N	O	F	He
Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	Ga	Ge	As	Se	Br	Ne
Ta	W	Re	Os	Ir	Pt	Au	Hg	In	Ti	Pb	Bi	Po	Ar
Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	Uup	Uub	Uus	Kr
DP	2 ⁺ DP	H ²⁺	W	U	D ²⁺ B ⁶⁺	H ⁶⁺	H ⁶⁺	U	U	U	U	U	Xe
IP	M ²⁺ B ⁶⁺	O ²⁺	K ²⁺	B ²⁺ V ⁶⁺	H ⁶⁺ V ⁶⁺	C ²⁺	H ⁶⁺	U	U	U	U	U	Rn
A	C ²⁺ V ⁶⁺	F ²⁺	C ²⁺	U ²⁺ C ²⁺	U ²⁺ C ²⁺	U ²⁺	U ²⁺	U	U	U	U	U	U

art. lebedev

Periodic Table of the Elements, in Pictures

<p>Group 1</p> <p>H 1 Hydrogen Sun & Stars</p> <p>Li 3 Lithium Watch Batteries</p> <p>Na 11 Sodium Baking Soda</p> <p>K 19 Potassium Fertilizer</p> <p>Rb 37 Rubidium Solar Cells</p> <p>Cs 55 Cesium Atomic Clocks</p> <p>Fr 87 Francium Few Uses Short-Lived</p>	<p>Group 2 Alkali Earth Metals</p> <p>Be 4 Beryllium Emeralds</p> <p>Mg 12 Magnesium Green Plants</p> <p>Ca 20 Calcium Teeth</p> <p>Sr 38 Strontium Fireworks</p> <p>Ba 56 Barium Stomach X-Rays</p> <p>Ra 88 Radium Luminous Paint</p>	<p>Key</p> <p>Symbol → C ← Atomic Number</p> <p>Name → Carbon</p> <p>Use or Occurrence → Plants and Animals</p> <p> Solid Liquid Gas at room temperature </p> <p> Radioactive Man-Made </p> <p>Color Key</p> <ul style="list-style-type: none"> Alkali Metals Alkali Earth Metals Transition Metals Other Metals Other Non-Metals Halogens Inert Gases Lanthanides Actinides Trans-Actinides 	<p>Atoms</p> <p>nucleus</p> <p>proton neutron electron</p> <p>Orbits</p> <p>Atoms have a nucleus of protons and neutrons surrounded by electrons.</p> <p>The number of electrons in an uncharged atom is the same as the number of protons.</p> <p>Molecules</p> <p>H₂O</p> <p>Atoms combine to make molecules by sharing or trading their outer electrons.</p> <p>Many atoms prefer to have eight electrons in their outer orbit like the oxygen atom in H₂O.</p>	<p>Group 3 Boron Group</p> <p>B 5 Boron Heat-Resistant Glassware</p> <p>Al 13 Aluminum Foil</p> <p>Ga 31 Gallium Light-Emitting Diodes</p>	<p>Group 4 Carbon Group</p> <p>C 6 Carbon Plants and Animals</p> <p>Si 14 Silicon Rocks, Sand, & Dirt</p> <p>Ge 32 Germanium Electronics</p> <p>Sn 50 Tin Cans</p> <p>Pb 82 Lead Weights</p>	<p>Group 5 Nitrogen Group</p> <p>N 7 Nitrogen Air</p> <p>P 15 Phosphorus Bones</p> <p>As 33 Arsenic Poison</p> <p>Sb 51 Antimony Type Metal</p> <p>Bi 83 Bismuth Fire Sprinklers</p>	<p>Group 6 Oxygen Group</p> <p>O 8 Oxygen Air Water</p> <p>S 16 Sulphur Egg Yolks</p> <p>Se 34 Selenium Solar Cells</p> <p>Te 52 Tellurium Solar Cells</p> <p>Po 84 Polonium Anti-Static Brushes</p>	<p>Group 7 Halogens</p> <p>F 9 Fluorine Toothpaste</p> <p>Cl 17 Chlorine Bleach</p> <p>Br 35 Bromine Sedatives</p> <p>I 53 Iodine Antiseptic</p> <p>At 85 Astatine Few Uses Short-Lived</p>	<p>Group 8 Inert Gases</p> <p>He 2 Helium Balloons</p> <p>Ne 10 Neon Signs</p> <p>Ar 18 Argon Light Bulbs</p> <p>Kr 36 Krypton Lasers</p> <p>Xe 54 Xenon Lighthouses</p> <p>Rn 86 Radon Radiation Therapy</p>
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T R A N S I T I O N M E T A L S

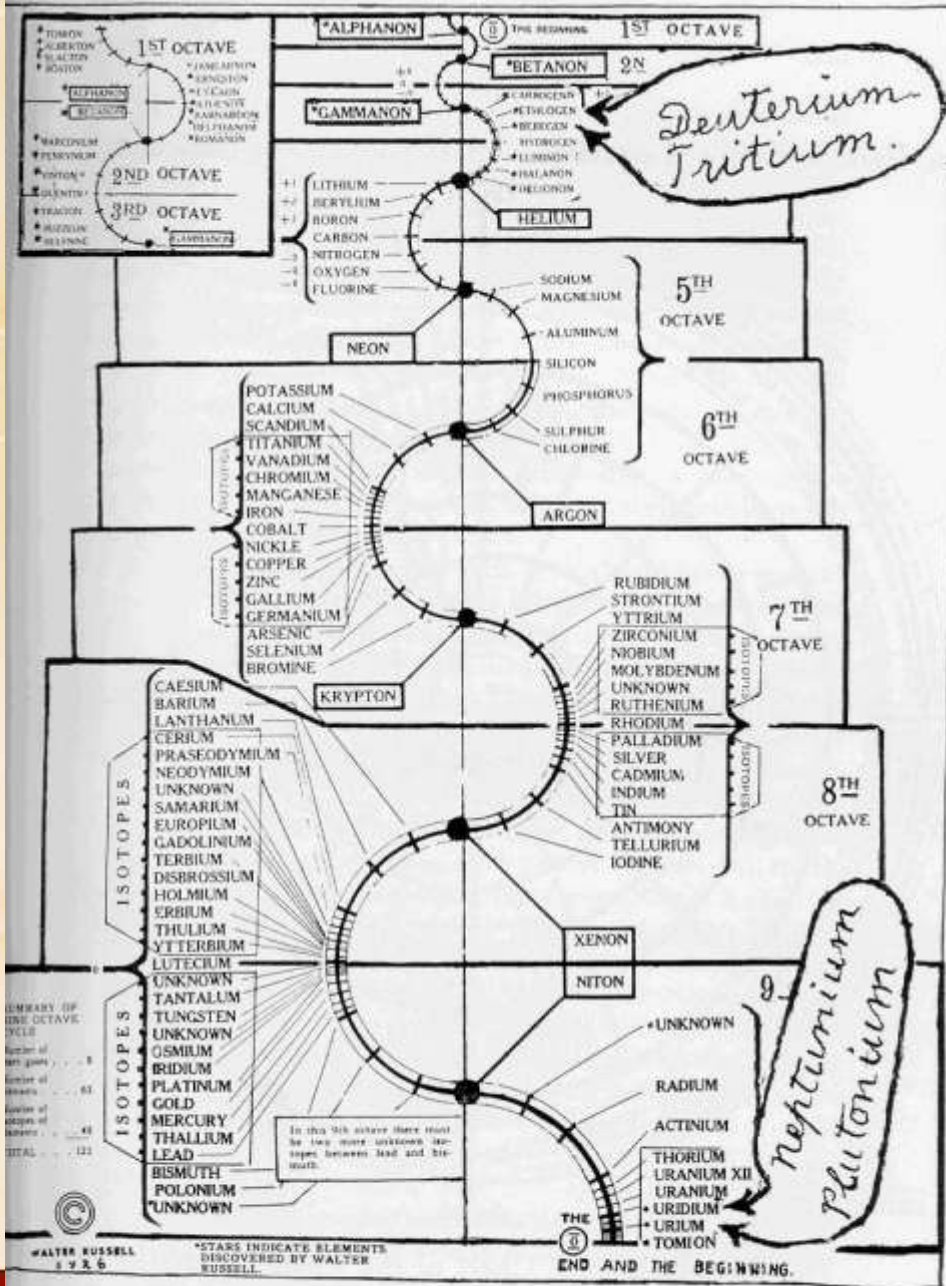
Sc 21 Scandium Aquamarines	Ti 22 Titanium Jets	V 23 Vanadium Springs	Cr 24 Chromium Car Trim	Mn 25 Manganese Rock Crushers	Fe 26 Iron Buildings	Co 27 Cobalt Magnets	Ni 28 Nickel Coins	Cu 29 Copper Electric Wires	Zn 30 Zinc Brass	Ga 31 Gallium Light-Emitting Diodes	Ge 32 Germanium Electronics	As 33 Arsenic Poison	Se 34 Selenium Solar Cells	Br 35 Bromine Sedatives	Kr 36 Krypton Lasers
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
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	
Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below	Lanthanides See Below
Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below	Actinides See Below

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

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

<p>Groups</p> <p>The vertical columns are called groups. Elements in the same group behave similarly because they have the same number of outer electrons.</p> <p>Group 1 has one outer electron, group 2 has two, etc. Most transition metals have two.</p>	<p>Lanthanides or Rare Earth Metals</p> <p>La 57 Lanthanum Arc Lamps</p> <p>Ce 58 Cerium Lighter Flints</p> <p>Pr 59 Praseodymium Welder's Goggles</p> <p>Nd 60 Neodymium Telescopes</p> <p>Pm 61 Promethium Spacecraft Power</p> <p>Sm 62 Samarium Arc Lamps</p> <p>Eu 63 Europium Color Phosphors</p> <p>Gd 64 Gadolinium Nuclear Control</p> <p>Tb 65 Terbium Lasers</p> <p>Dy 66 Dysprosium Nuclear Control</p> <p>Ho 67 Holmium Color Phosphors</p> <p>Er 68 Erbium Color Phosphors</p> <p>Tm 69 Thulium Color Phosphors</p> <p>Yb 70 Ytterbium Color Phosphors</p> <p>Lu 71 Lutetium Color Phosphors</p>	<p>Actinides</p> <p>Ac 89 Actinium Neutron Source</p> <p>Th 90 Thorium Lantern Mantles</p> <p>Pa 91 Protactinium Few Uses Very Rare</p> <p>U 92 Uranium Nuclear Power</p> <p>Np 93 Neptunium Neutron Detectors</p> <p>Pu 94 Plutonium Nuclear Weapons</p> <p>Am 95 Americium Smoke Detectors</p> <p>Cm 96 Curium Spacecraft Power</p> <p>Bk 97 Berkelium Few Uses</p> <p>Cf 98 Californium Gauges</p> <p>Es 99 Einsteinium Short-Lived (Months)</p> <p>Fm 100 Fermium Short-Lived (Days)</p> <p>Md 101 Mendelevium Short-Lived (Hours)</p> <p>No 102 Nobelium Short-Lived (Minutes)</p> <p>Lr 103 Lawrencium Short-Lived (Seconds)</p>
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The Russell Periodic Chart of the Elements, No. 1



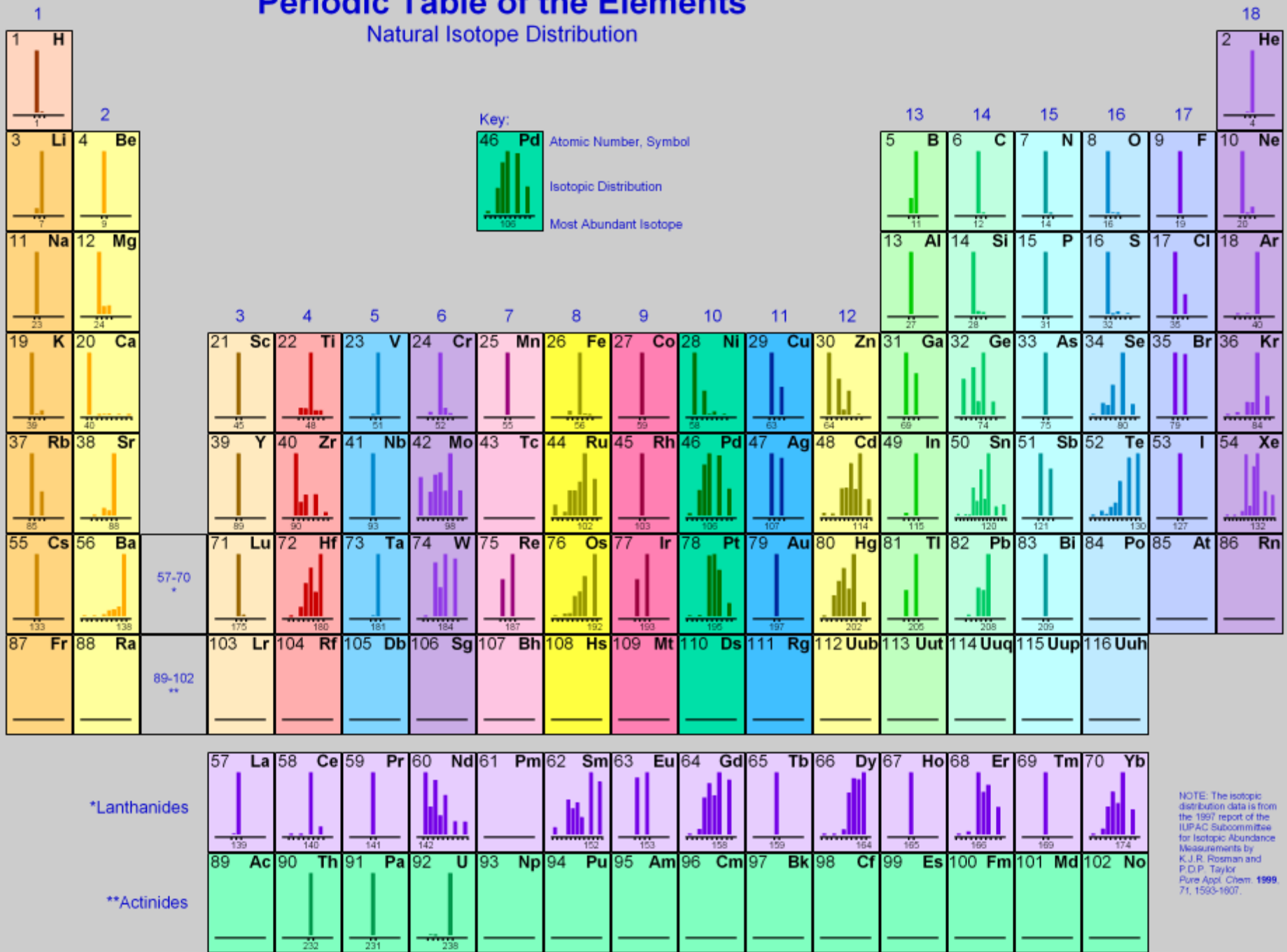
These data are based on interatomic distances in the structures of the elements. (Radii for metals correspond to coordination numbers of 12.) Where no radius value can be found for a particular element, its radius has been set to a default value of 1 Å and a circle is plotted instead of a rendered sphere. 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-

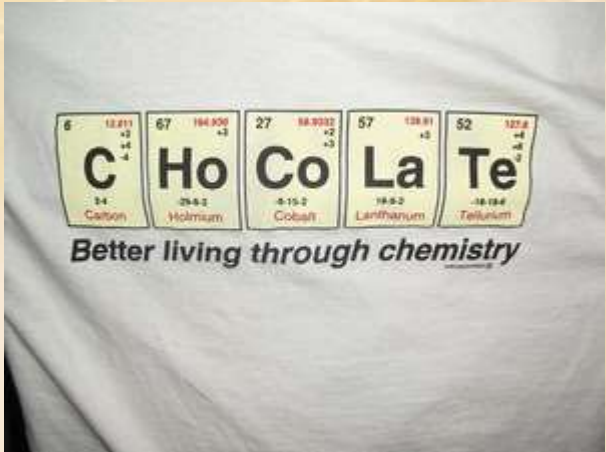


Periodic Table of the Elements

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.



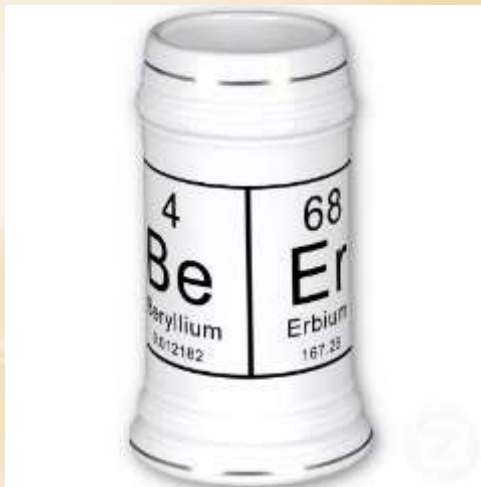


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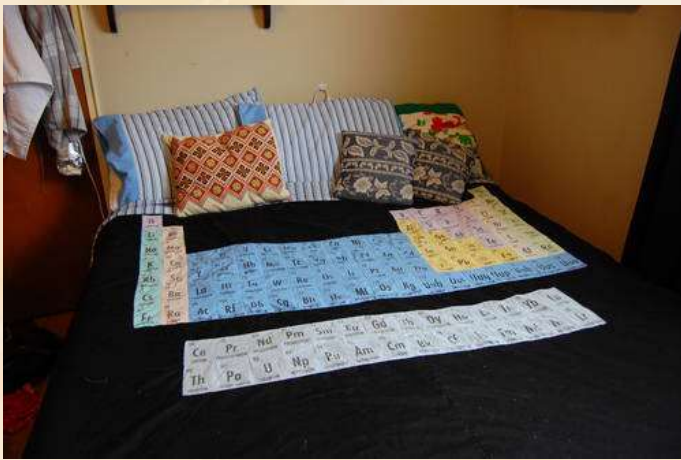




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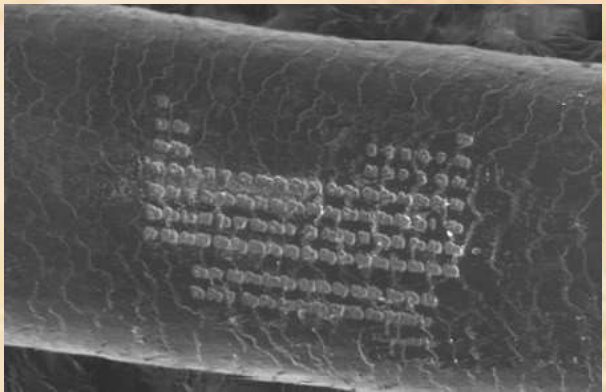
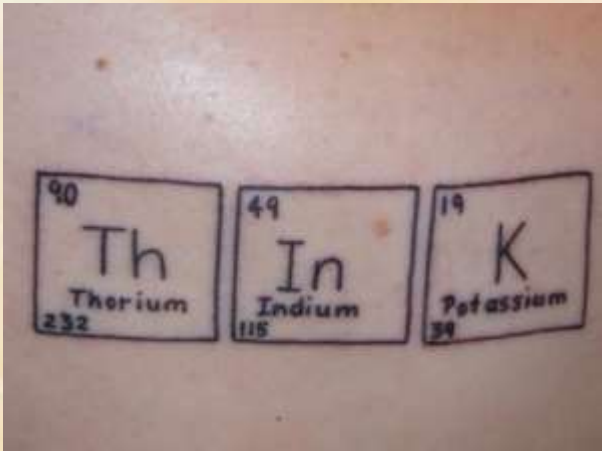
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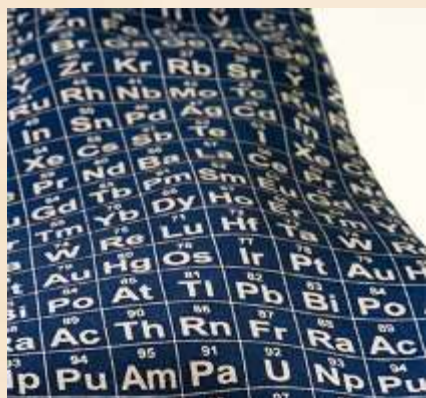


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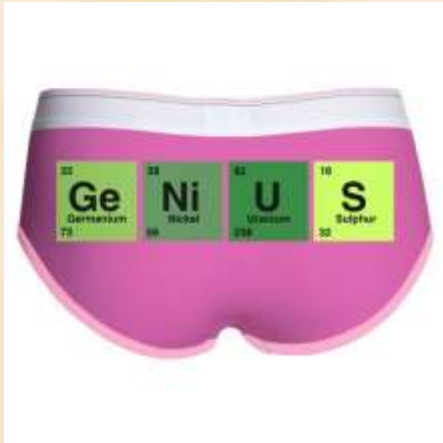
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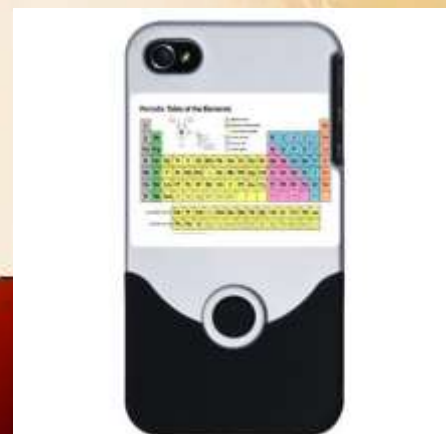
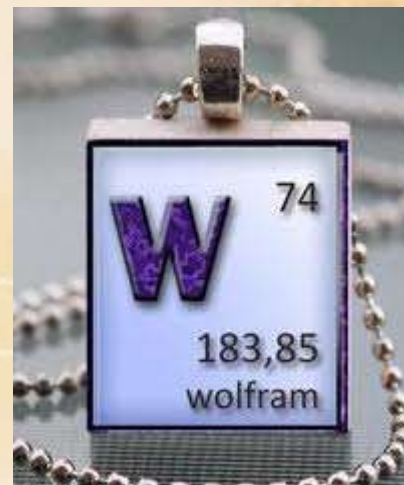


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PERIODIC TABLE *of* SEX

The image shows a satirical periodic table titled "PERIODIC TABLE of SEX". The table consists of 58 numbered cells, each containing a different sexual act or pose. The elements are arranged in a grid that mimics the structure of a standard periodic table, including a separate block for elements 43-50 and another for 51-58. Above the main table, there are diagrams of male and female genitalia. The table is color-coded with green and purple highlights for certain elements. The title "PERIODIC TABLE of SEX" is written in a stylized font, with "of" in italics.

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

H																He															
Li	Be													B	C	N	O	F	Ne												
Na	Mg													Al	Si	P	S	Cl	Ar												
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr														
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe														
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn														
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cp																				
																		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
																		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

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PERIODIC TABLE OF THE VEGETABLES

KEY TO CHART

H	KEY TO CHART																He				
Li	Be															B	C	N	O	F	Ne
Na	Mg															Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe				
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn				
Fr	Ra	Ac																			





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Su SUBSTANCE

WASHINGTON STATE PERIODIC TABLE OF WINES

Cs CABERNET SAUVIGNON	Me MERLOT									
Cf CABERNET FRANC	Mb MERLOT BLEND	Pv PINOT VITIFOLIOLUS					Se SEMILON			
Sy SYRAH	Gr GRACE	Mv MERLOT VITIFOLIOLUS	Ci CABERNET	Co CORVINA			Vg VITIFOLIOLUS	Mn MERLOT BLEND	Rn RHOEN	
					Pn PINOT NERVOUS	Ch CHARDONNAY				
							Cb CABERNET BLEND	Sb SAUVIGNON BLEND		
							Gw GAMAY			
Sg SYRAH GRACE	Pr PINOT ROUGE	Do DOUGLAS	Bb BONNARD	Nb NORONDA	Mc MERLOT BLEND	Pg PINOT GRACE				
					Te TERRA					
							Re RENO	Mt MERLOT BLEND		
					Bl BLANC					

CLASSIC AREAS
OF ORIGIN

BORDEAUX

BORDEAUX

RHONE

BURGUNDY

LOIRE

ALSACE

ITALY

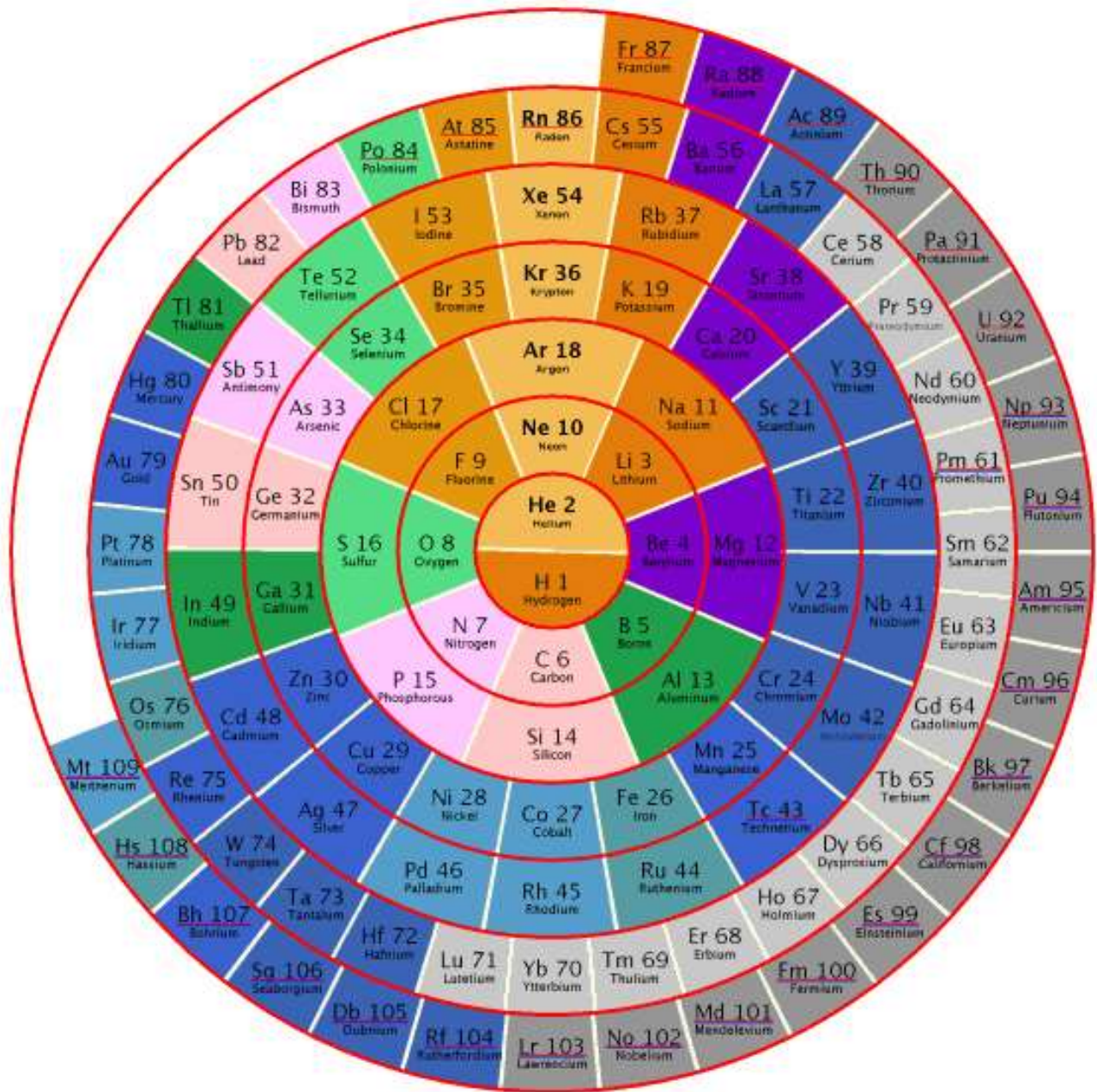
SPAIN

GERMANY

AUSTRIA



Mayan Periodic Chart of the Elements



The Periodic Table of Dessert

S ^{3.8} Sugar																	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



Key

Style number
10

Style name
Pale ale

ABV
5.0-7.0

IBU
20-40

Original gravity

1.040-1.050

Final gravity

1.010-1.015

SRM

10-15

Key to yeast type

1.000-1.005 (Ale)

1.010-1.015 (Lager)

Style family key

- 1.000-1.005 (Ale)
- 1.010-1.015 (Lager)
- 1.020-1.025 (IPA)
- 1.030-1.035 (Pils)
- 1.040-1.045 (Bitter)
- 1.050-1.055 (Stout)
- 1.060-1.065 (Porter)
- 1.070-1.075 (Brown)
- 1.080-1.085 (Mild)
- 1.090-1.095 (Strong)

Mixed Styles

55. Koffie	56. Witte de garde	57. Oudbruin	58. Cicerone ale	59. Imperial stout	60. English ale (strong) ale
61. Afbiss		62. Vienna	63. Munich beer	64. Backyard	65. Strong "special" ale



SISTEMA PERYÓDICO

1°



2°



3°



Un equipo de investigadores de la Otonomic Yunibersiti ha logrado fotografiar los átomos en su estado fundamental. En este sistema peryódico (HIO₄) se pueden observar ciertas modificaciones en la nomenclatura para que su estudio sea mas lógico y comprensible.

"Omnia mentira est"
.MENDELEJEV.

IIIA

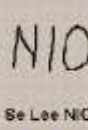
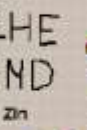
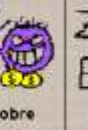
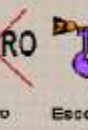
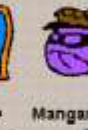
IVA

VA

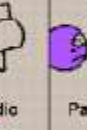
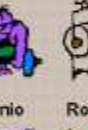
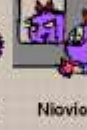
VIA

VIIA

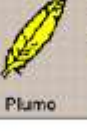
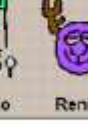
4°



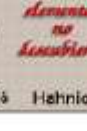
5°



6°



7°



Zorbo demoral no descubierta

Santanidos



Mactinidos



PERIODIC TABLE of MIXOLOGY



NUMBER, SYMBOL, AND NAME OF ELEMENTS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108

109	110	111	112	113	114	115	116	117	118
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

109 110 111 112
113 114 115 116
117 118

1 100% Malt As Asahi Lager	2 100% Malt Rh Rhine Lager
4 100% Malt Bm Brewery Malt	5 100% Malt Cb Czech Beer
8 100% Malt Cm Czech Malt	9 100% Malt Hs Hops
19 100% Malt Hp Hop	20 100% Malt Mg Malt
30 100% Malt Mm Malt	31 100% Malt Pp Pilsener
41 100% Malt Ss Sour	42 100% Malt Tt Tonic

10 100% Malt Bb Brewery	11 100% Malt Br Brewery	12 100% Malt Bf Brewery	13 100% Malt Cc Czech	14 100% Malt Af Austrian	15 100% Malt Cs Czech	16 100% Malt Df Dutch	17 100% Malt Cq Czech	18 100% Malt Ca Czech
21 100% Malt Cl Czech	22 100% Malt Cr Czech	23 100% Malt Ds Dutch	24 100% Malt Ej Elder	25 100% Malt Dm Dutch	26 100% Malt Fa Fruit	27 100% Malt Fc Fruit	28 100% Malt Cg Czech	29 100% Malt Cn Czech
32 100% Malt Hc Hops	33 100% Malt Hw Hops	34 100% Malt Li Lager	35 100% Malt Pl Pilsener	36 100% Malt Fh Fruit	37 100% Malt Gs Grape	38 100% Malt Rr Rye	39 100% Malt Fd Fruit	40 100% Malt Ff Fruit

43 100% Malt Ar Austrian	44 100% Malt Bt Brewery	45 100% Malt Bs Brewery	46 100% Malt Bz Brewery	47 100% Malt Cz Czech	48 100% Malt Ga Grape	49 100% Malt Gd Grape	50 100% Malt Jb Jelly
51 100% Malt Kz Korn	52 100% Malt Ld Lager	53 100% Malt Pb Pilsener	54 100% Malt Ph Pilsener	55 100% Malt Rm Rye	56 100% Malt Sb Sour	57 100% Malt Sa Sour	58 100% Malt Ww Wheat

KEY

20
100% Malt
Mg
Malt

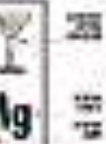


Tabla periódica

¿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

1 H 1.01																	18 He 4.00
3 Li 6.94	2 Be 9.01	ns ¹										5 B 10.81	6 C 12.01	7 N 14.01	8 O 15.99	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 25.31	3	4	5	6	7	8	9	10	11	12	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (270)	109 Mt (268)	110 Ds (281)	111 Rg (272)	nfx						



58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

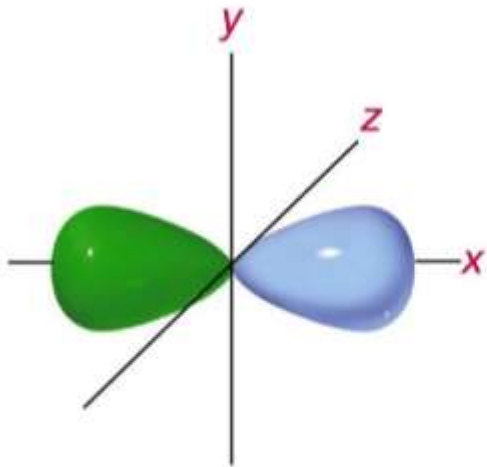


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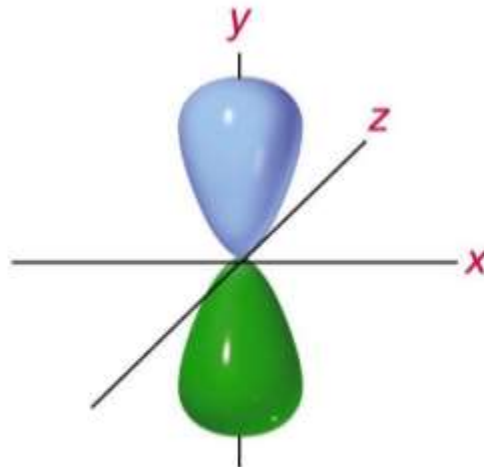
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<input type="checkbox"/> 2s	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>				8
<input type="checkbox"/> 3s	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			18
<input type="checkbox"/> 4s	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		32
<input type="checkbox"/> 5s	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	32
<input type="checkbox"/> 6s	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	32
<input type="checkbox"/> 7s	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	32



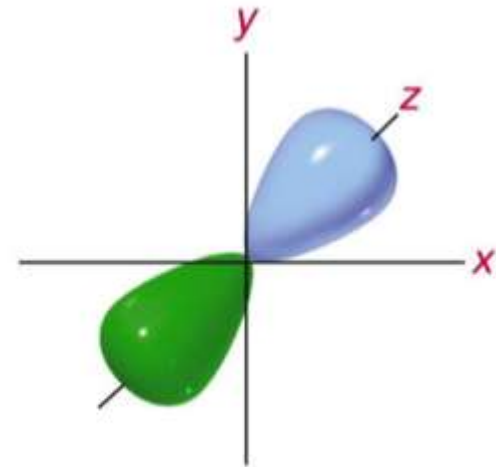
Forma de los orbitales



$2p_x$ orbital



$2p_y$ orbital

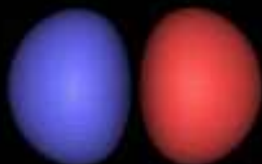


$2p_z$ orbital

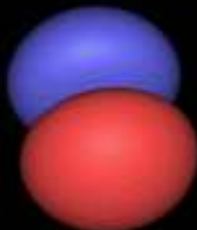




s



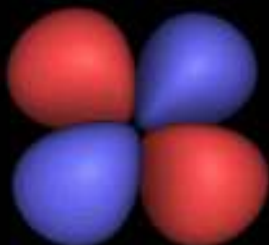
p_x



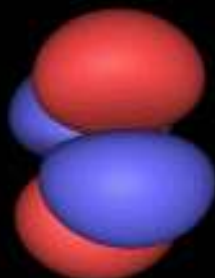
p_y



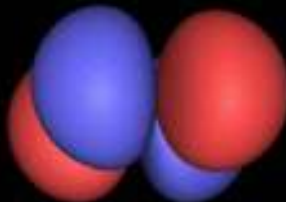
p_z



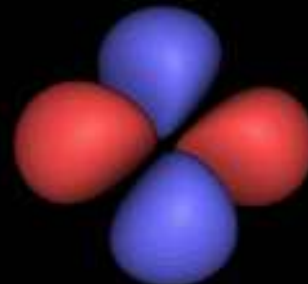
d_{xy}



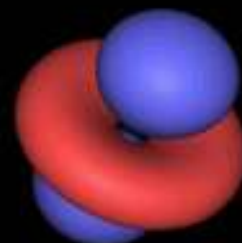
d_{xz}



d_{yz}



$d_{x^2 - y^2}$



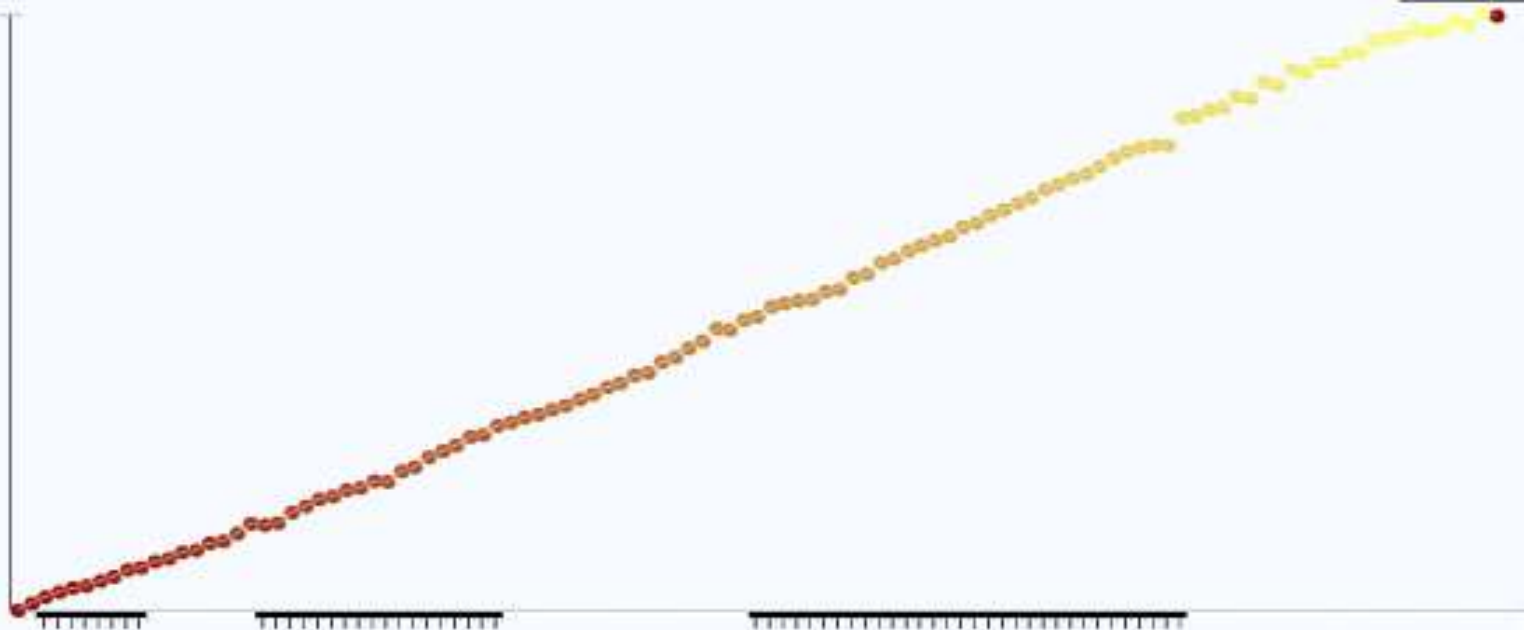
d_{z^2}



Tabla periódica

Masa Atómica (uma)

- datos
- puntos
- barras
- tabla

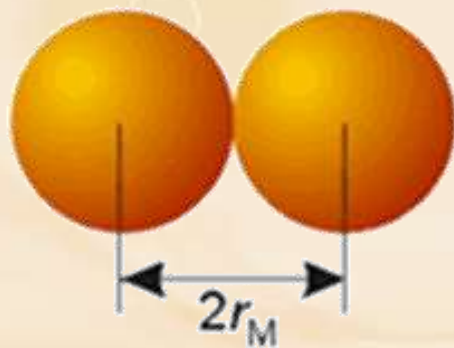


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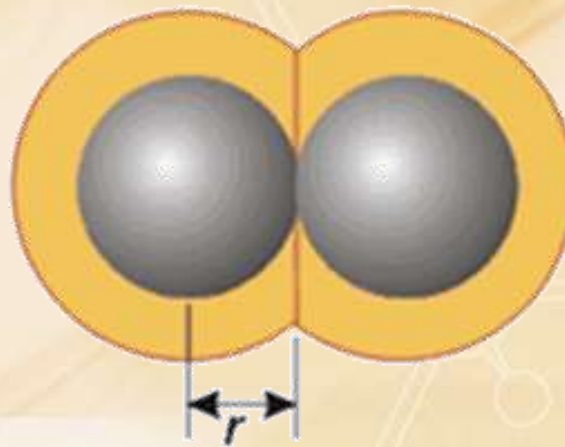


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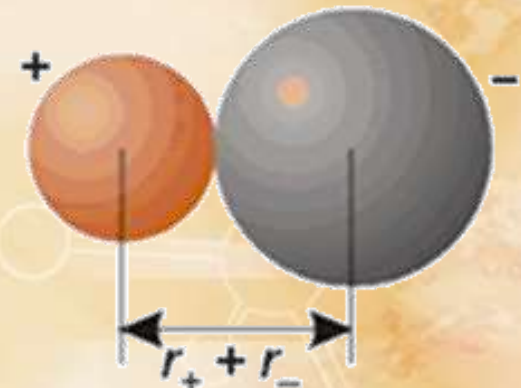
¿Que es el rádio?



Radio metálico



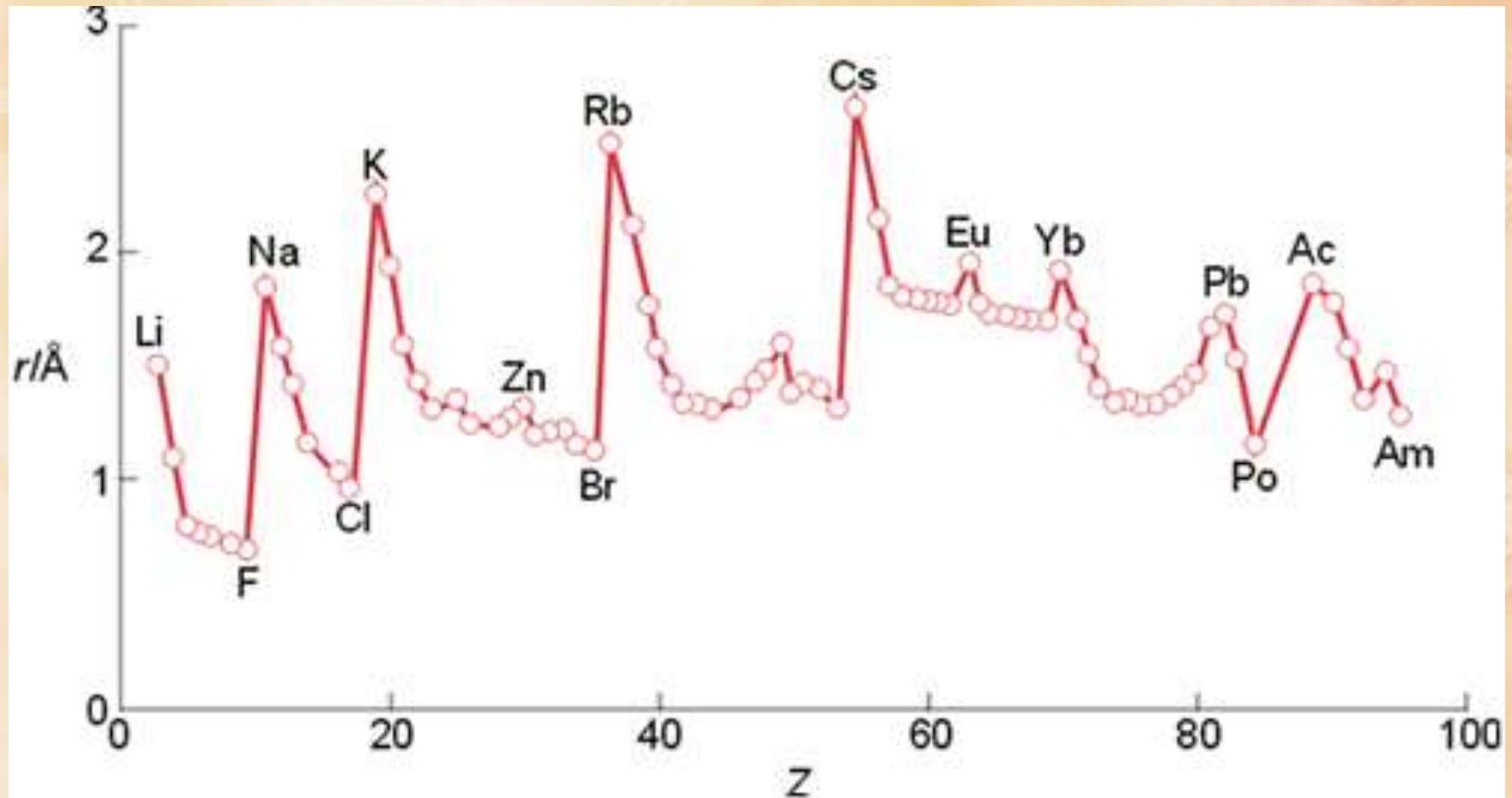
Radio covalente



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

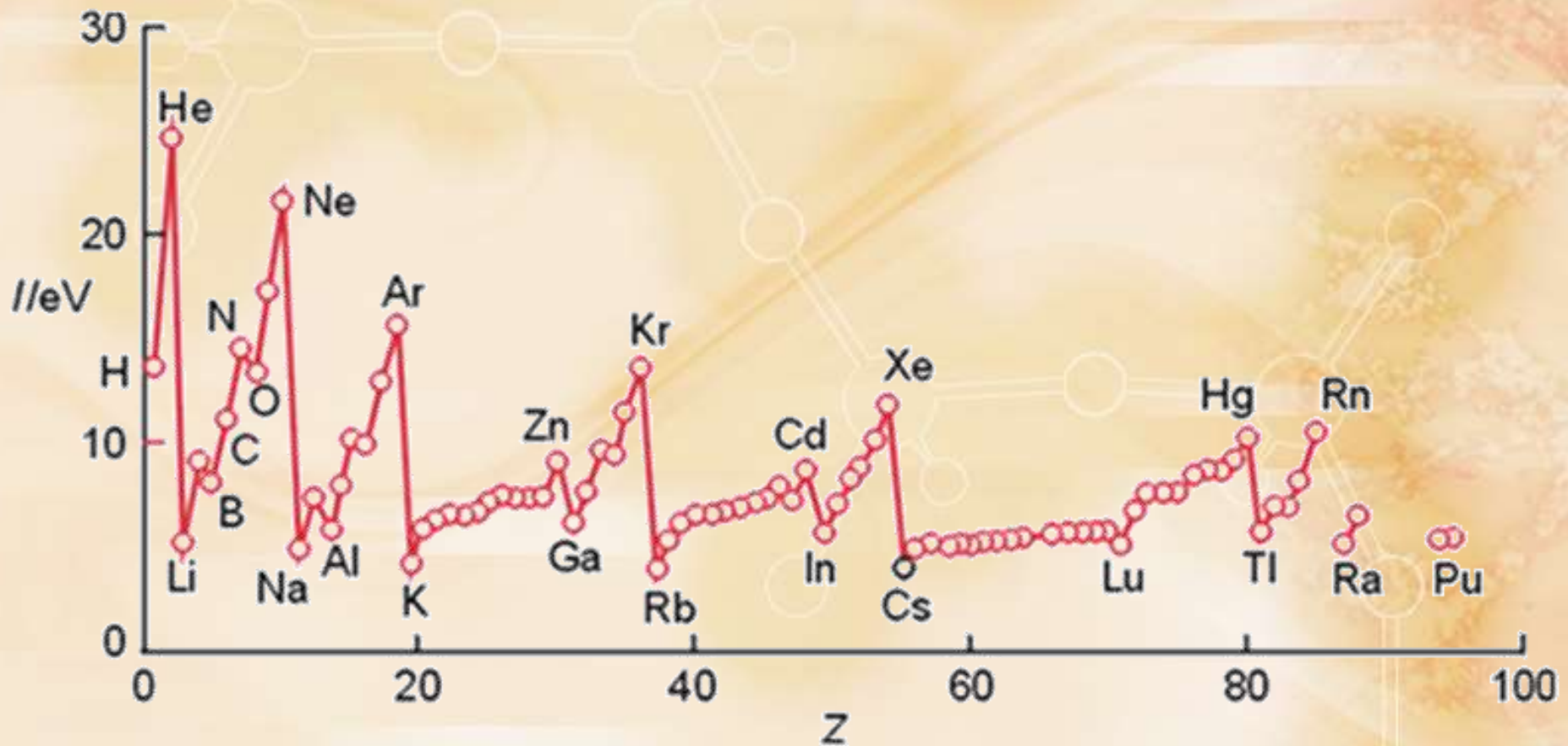


Tabla periódica

Segunda Energía de Ionización (kJ/mol)

- datos
- puntos
- barras
- tabla

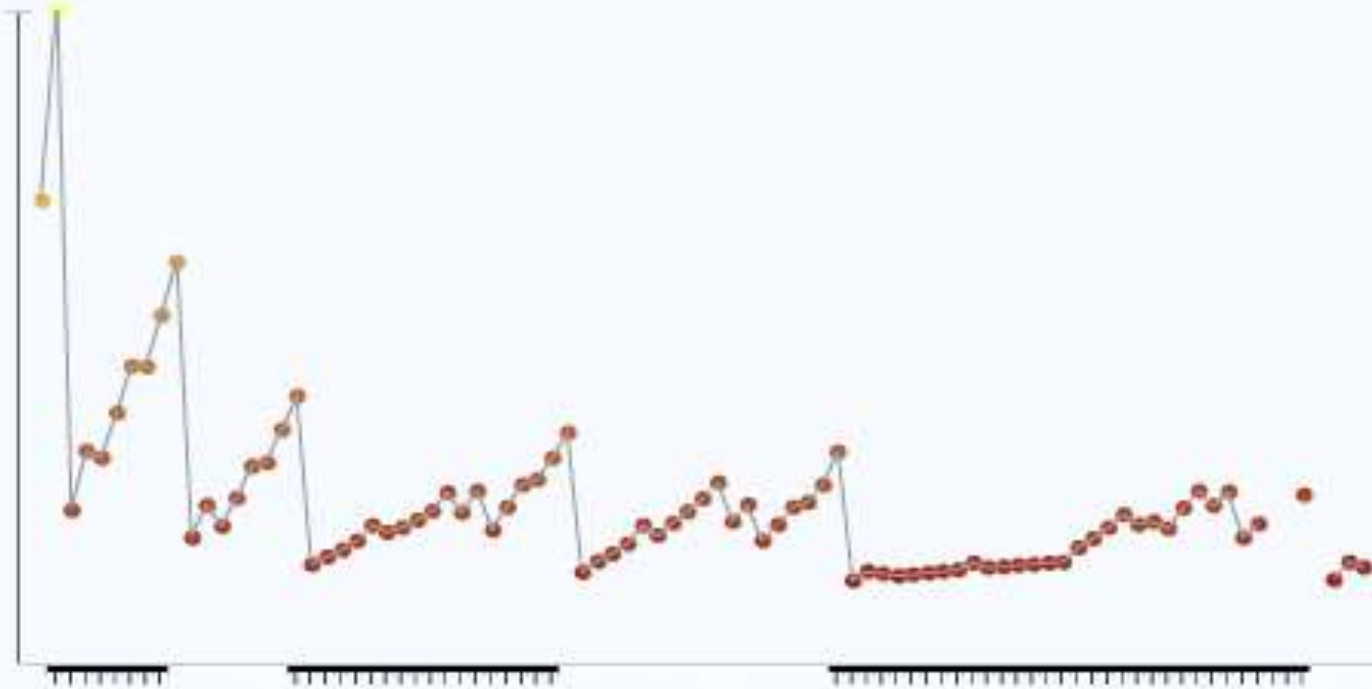
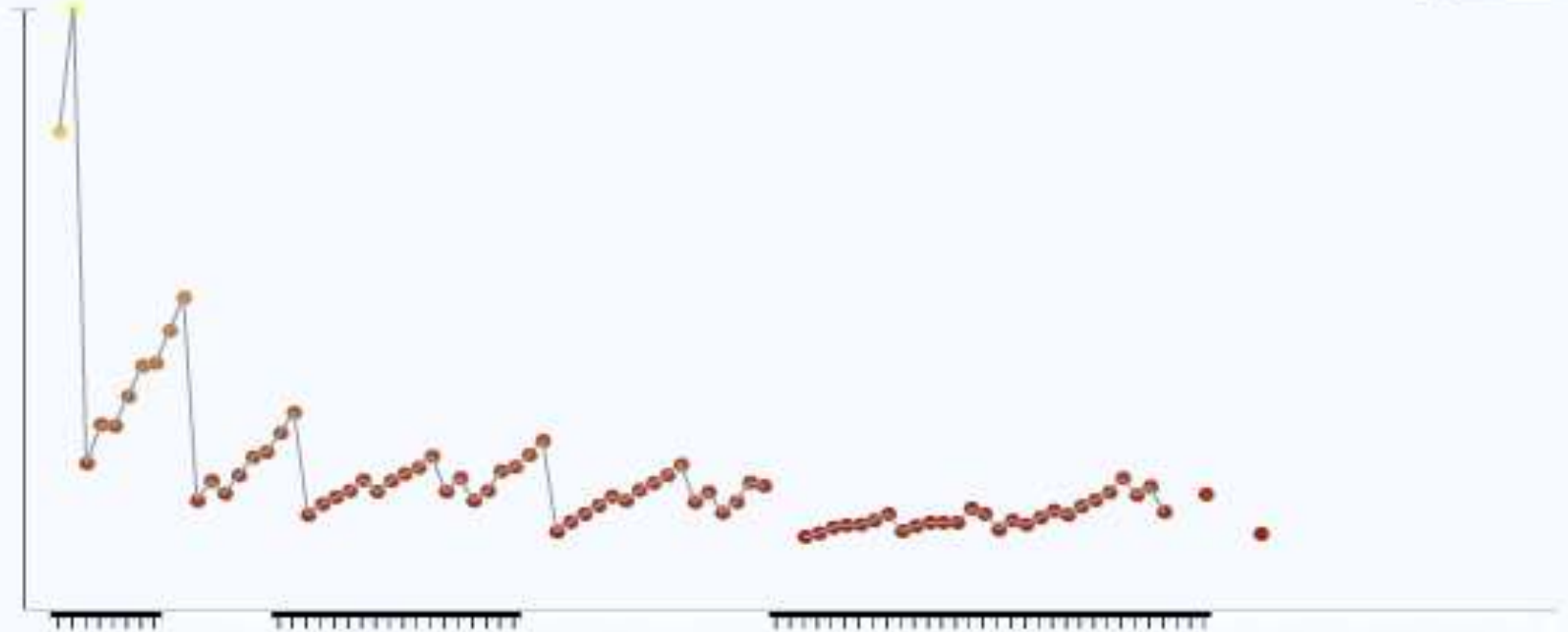


Tabla periódica

Tercera Energía de Ionización (kJ/mol)

- datos
- puntos
- barras
- tabla



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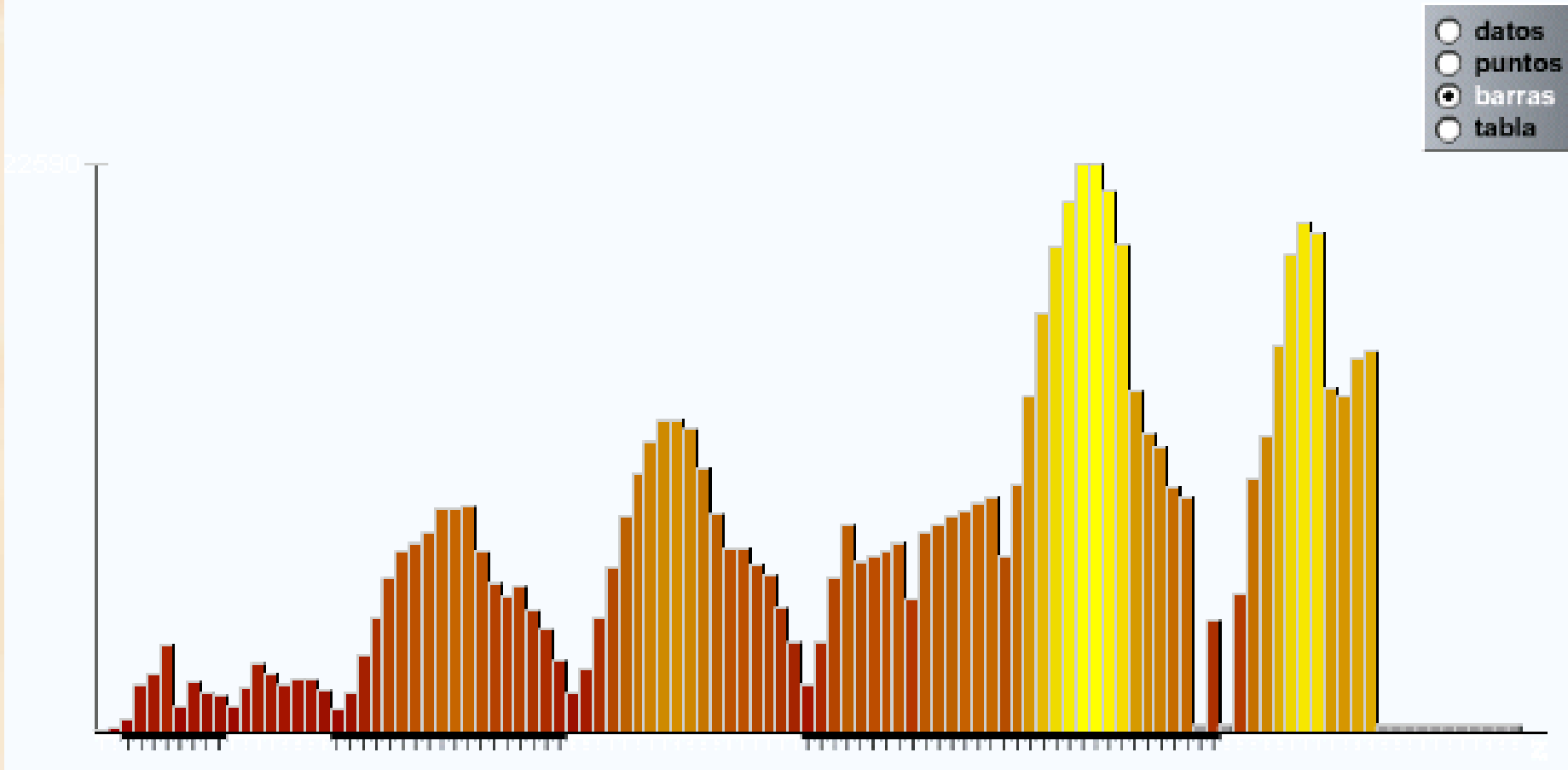


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Tabla periódica

Densidad (kg/m³)



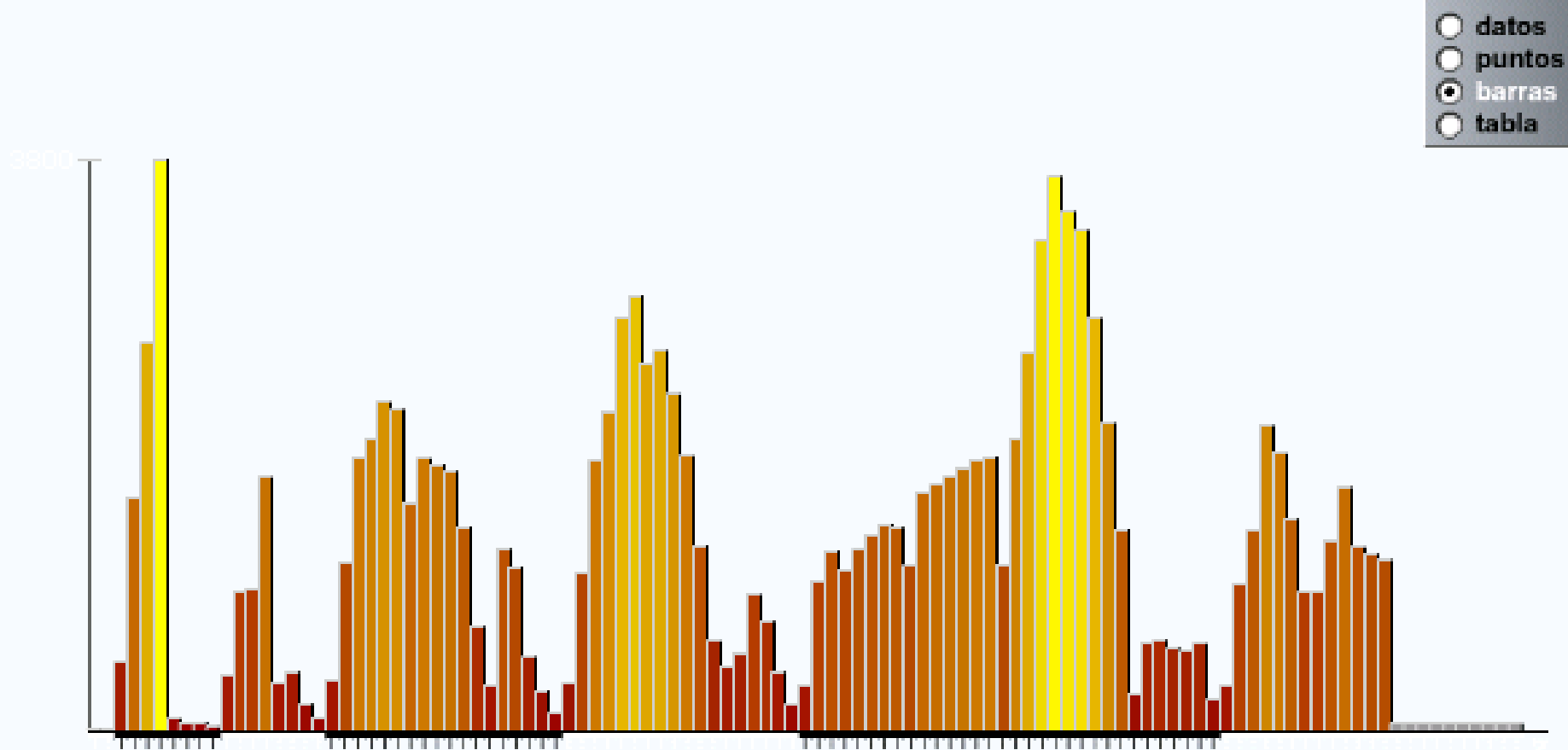
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Tabla periódica

Punto de Fusión (K)



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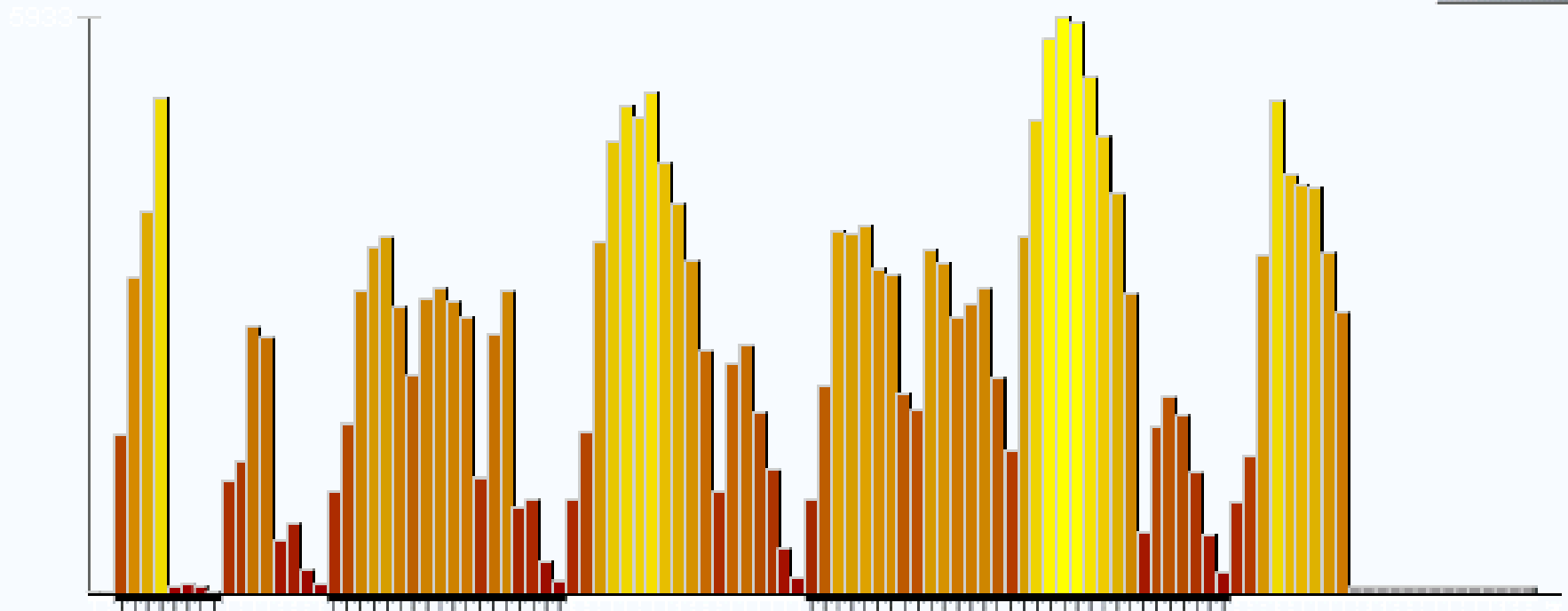
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Tabla periódica

Punto de Ebullición (K)

- datos
- puntos
- barras
- tabla



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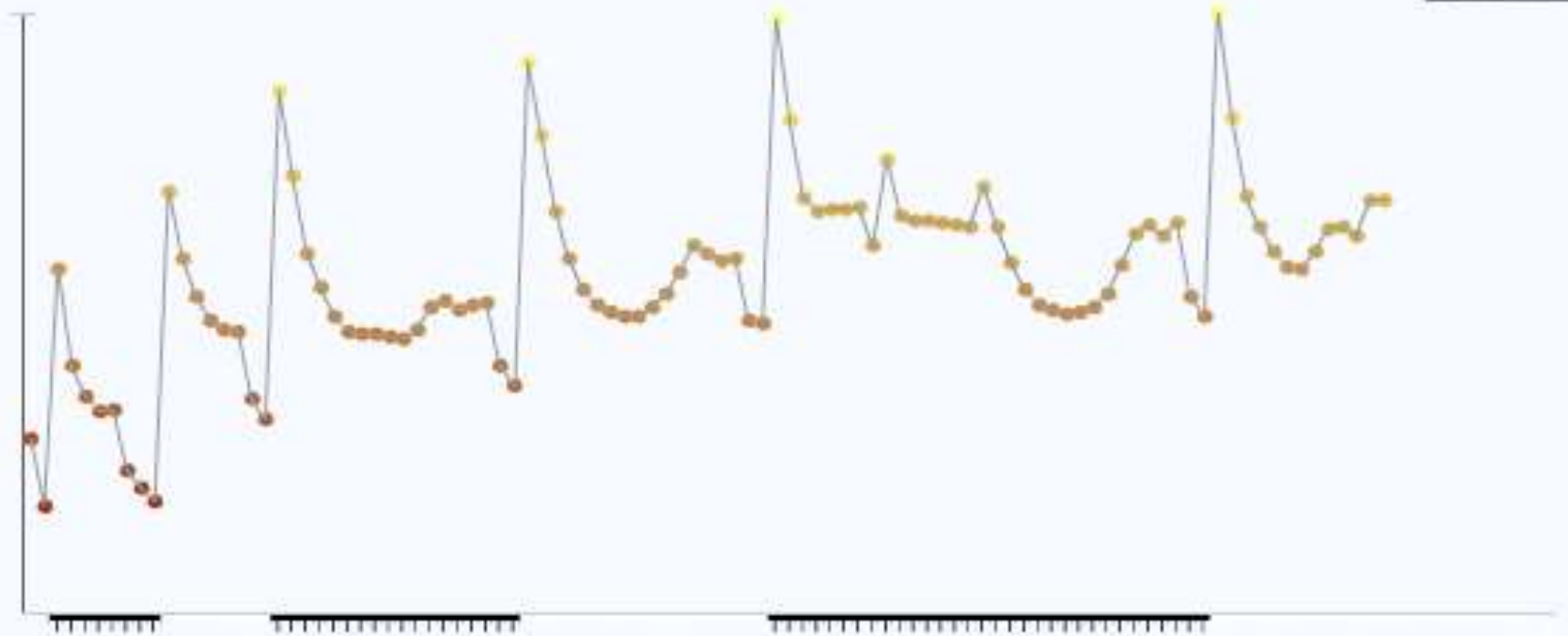
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Tabla periódica

Radio Atómico (Å)

- datos
- puntos
- barras
- tabla



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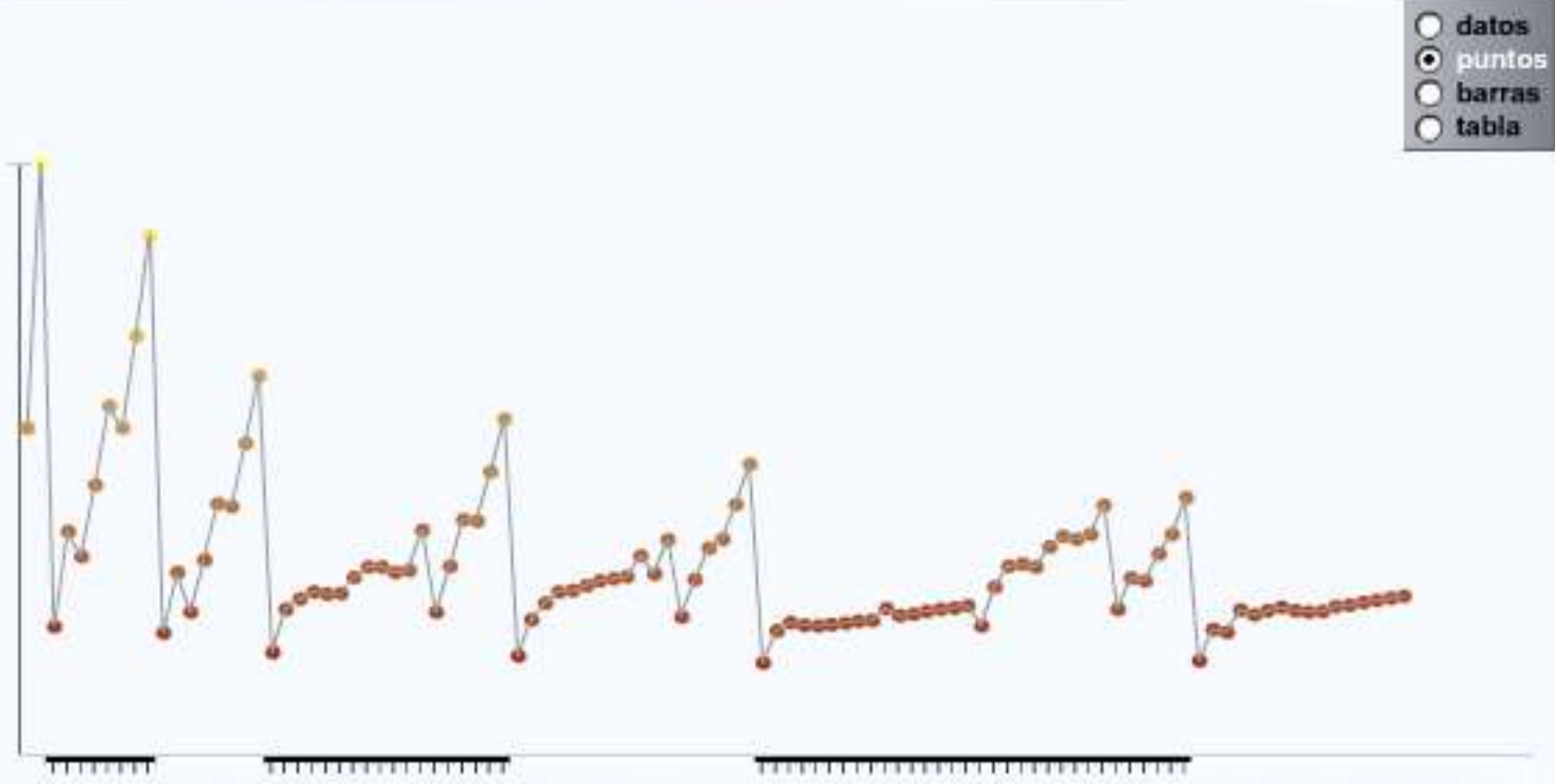


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Tabla periódica

Primera Energía de Ionización (kJ/mol)



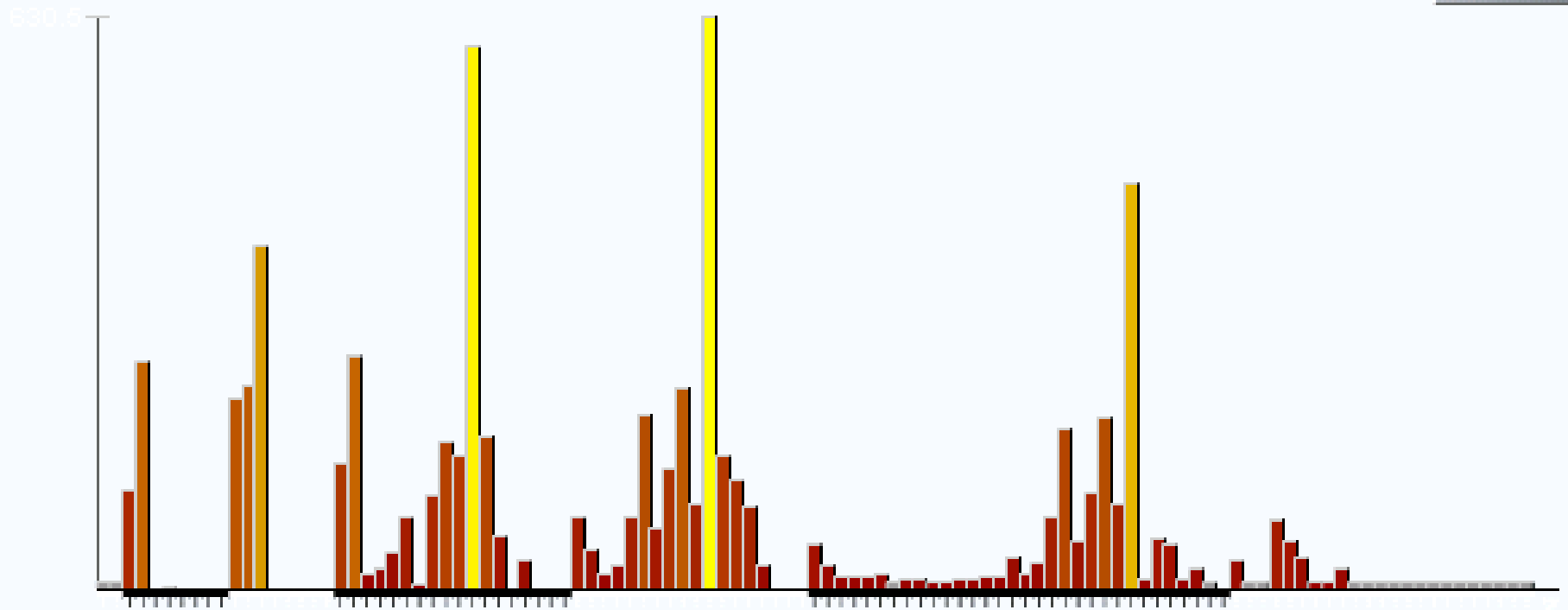
2 Helio = 2372.3



Tabla periódica

Conductividad Eléctrica ((mohm.cm)⁻¹)

- datos
- puntos
- barras
- tabla



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Electronegatividad de Pauling

VARIACIÓN DE LA ELECTRONEGATIVIDAD

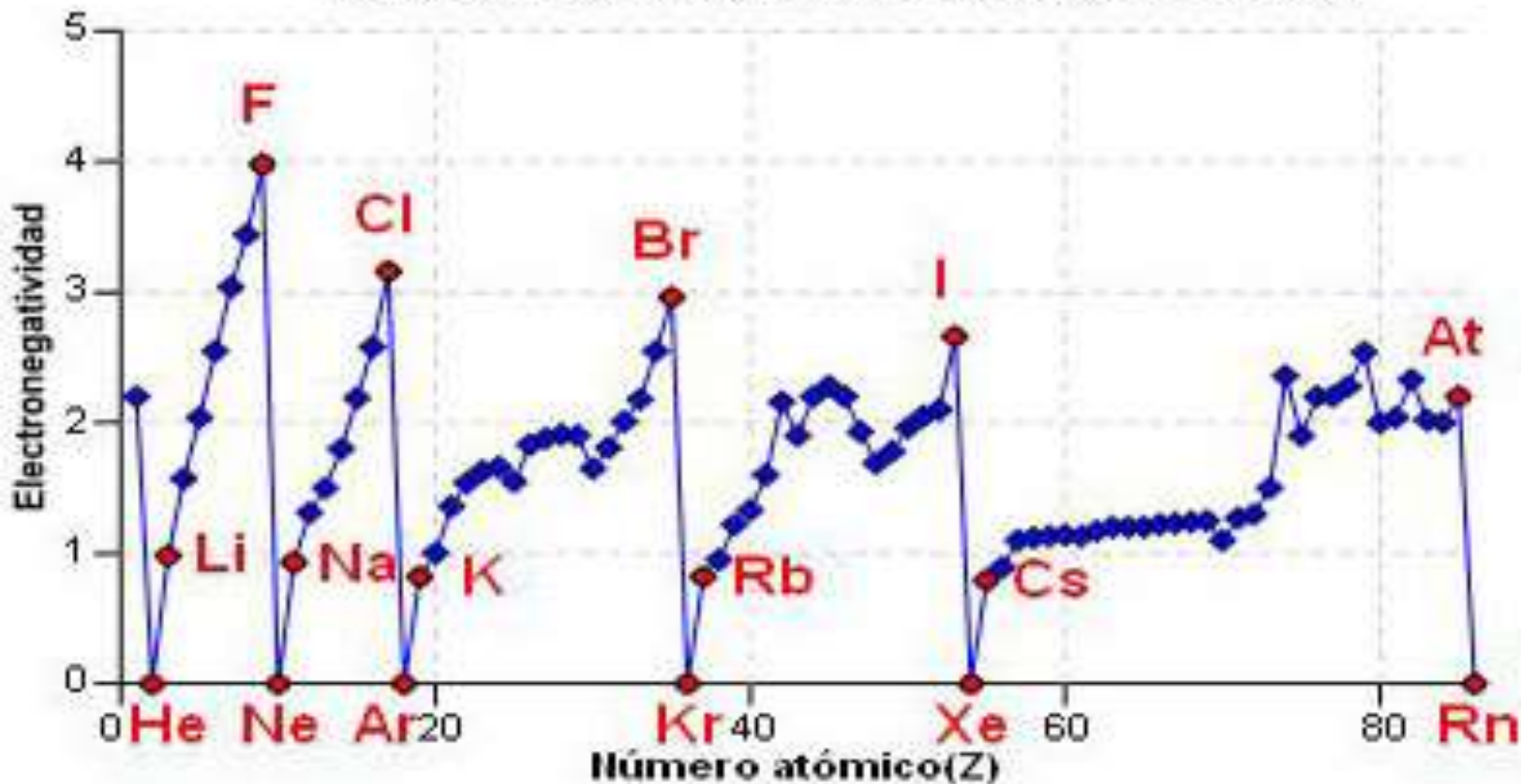


Tabla periódica

Electronegatividad (Escala de Pauling)

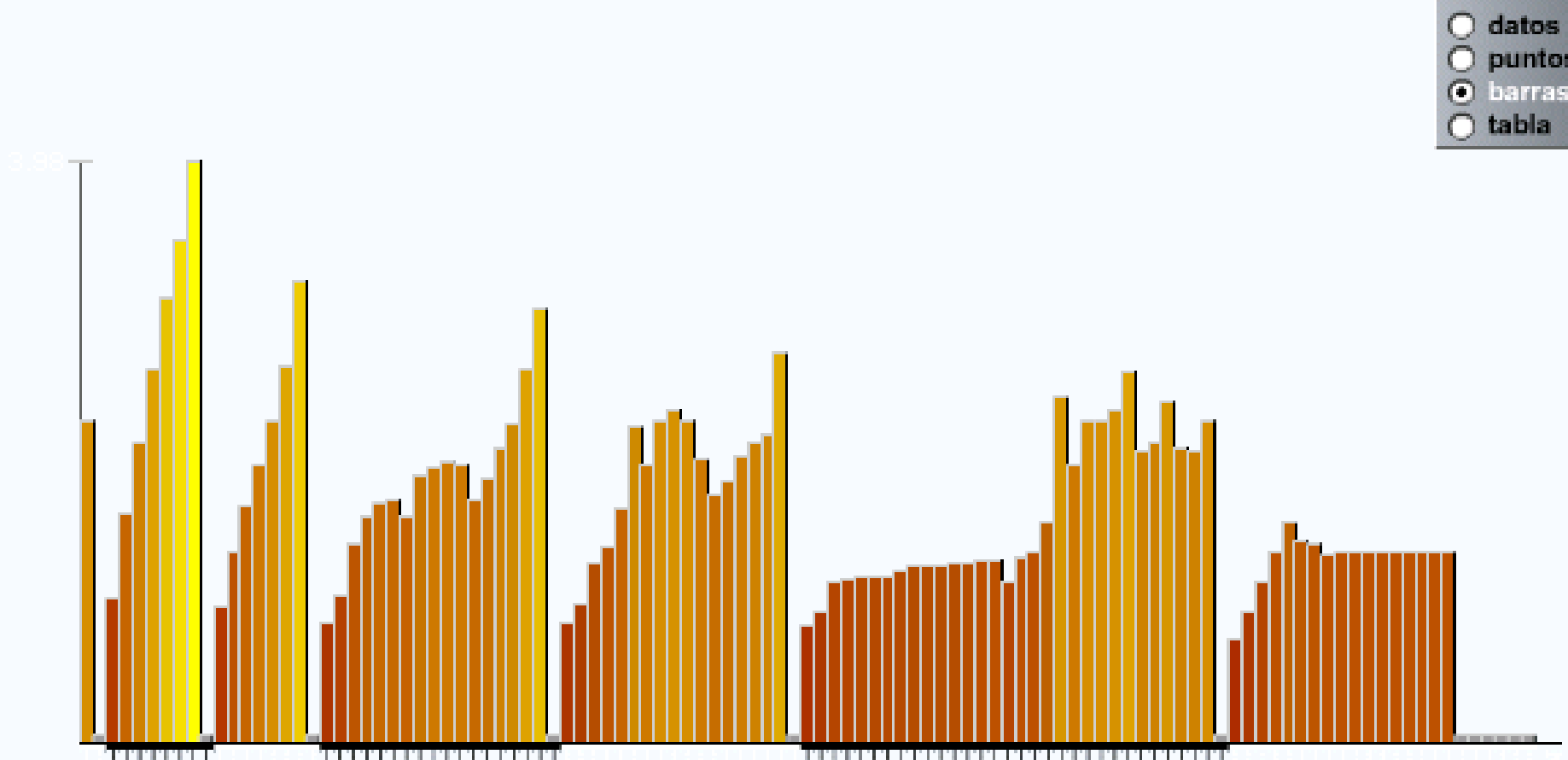
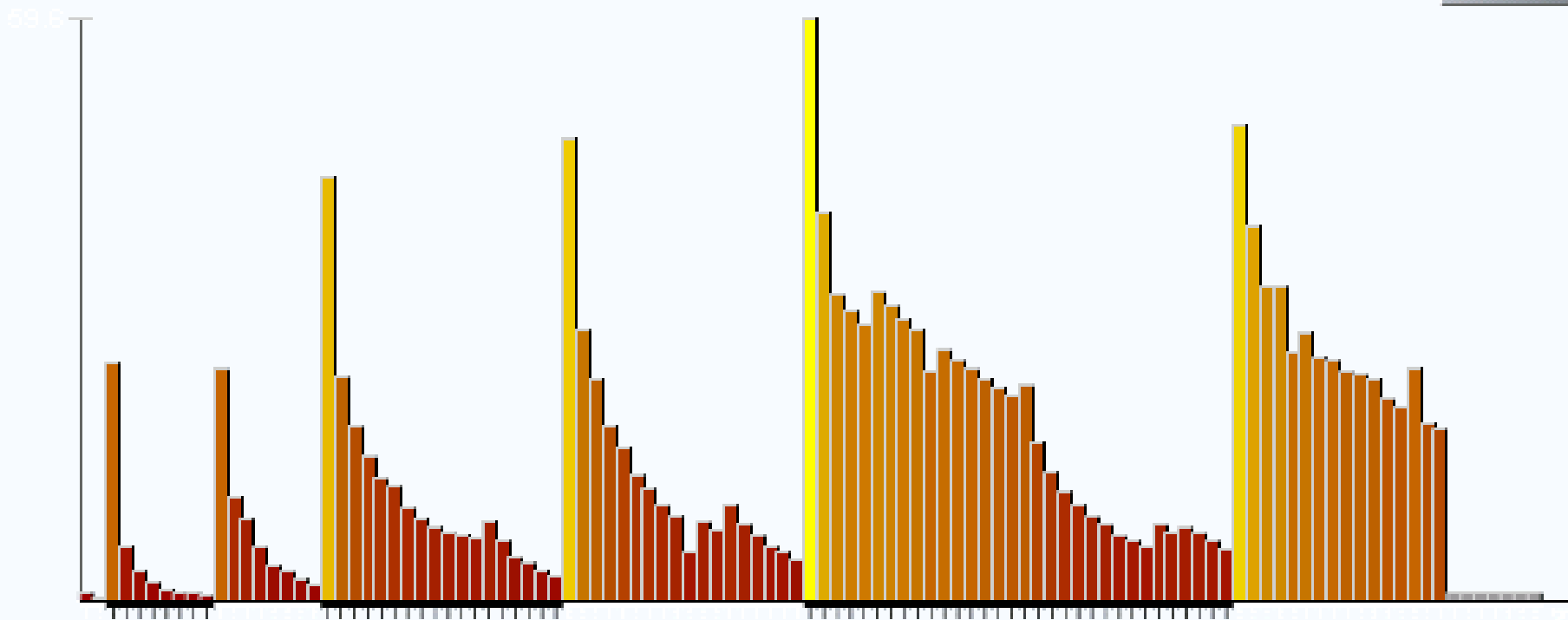


Tabla periódica

Polarizabilidad (\AA^3)

- datos
- puntos
- barras
- tabla



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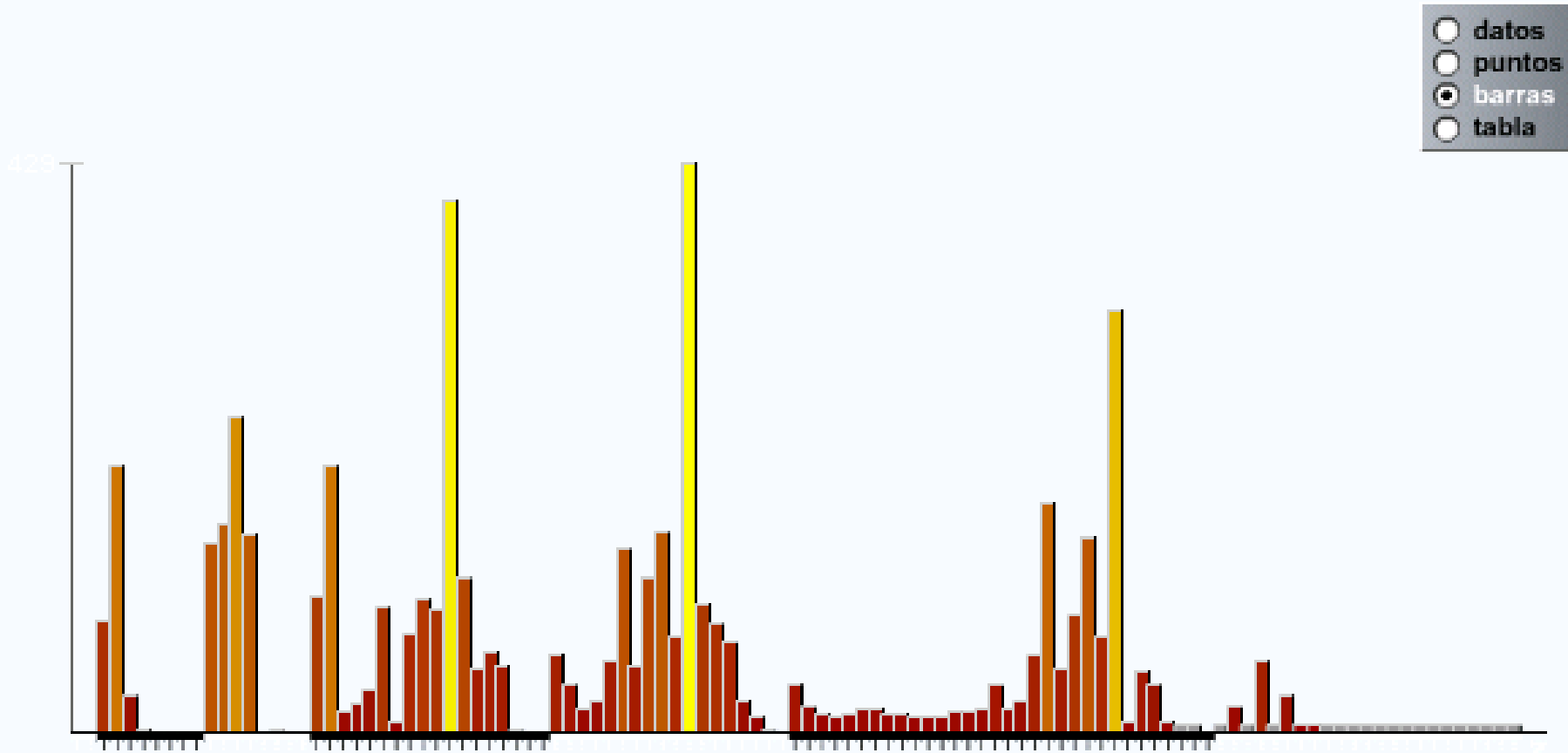
http://www.pbslearningmedia.org/asset/lsp07_int_graphperiodic/

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



Tabla periódica

Conductividad Térmica ($J/m \cdot s \cdot ^\circ C$)



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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

