

MATHEMATICAL SYSTEMATIZATION AND TYPIFICATION OF CHEMICAL ELEMENTS

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Abstract

In the squares of even numbers, a regular distribution of natural numbers in different types is revealed. On this basis, the systematization and typification of the whole multitude of chemical elements is carried out. In the formulas of mathematical systematization and typification there is no strict periodicity in the System of chemical elements. Formulas are embodied in continuously-complete 4-Level Tables of chemical elements.

Keywords: even numbers, chemical elements, 4-Level Tables

Introduction

In the Systematization of chemical elements, conducted more than two centuries, there are no mathematical formulas for all chemical elements. The Newlands Law of octaves covers about 41%, and the formula of quantum mechanics is about 50% of the chemical elements known to date. The Periodic Law is formulated only verbally and is represented by Periodic Tables of chemical elements.

The research is devoted to:

1. Identification of mathematical formulas for the continuous-complete distribution of 1-120 quantity-numbers.
2. Identification of graphical incarnations of formulas for the continuous-complete distribution of 1-120 quantity-numbers.
3. Investigation of the distribution of numbers for periodicity.

4. Comparison of graphical incarnations of formulas for the continuous-complete distribution of 1-120 quantity-numbers with the order distribution of chemical elements.
5. Construction of continuously-complete Tables of chemical elements.

1. Some regularities of the squares of even numbers

The square of even numbers $(2n)^2$ for $n = 1; 2; 3; 4$:

$$(2n)^2 = 4; 16; 36; 64 \quad (1)$$

The square of any integer n is equal to the sum of odd numbers:

$$n^2 = \Sigma (2n-1) \quad (2)$$

$$\text{Then: } (2n)^2 = 4n^2 = (2 \times 2) [(1), (1 + 3), (1 + 3 + 5), (1 + 3 + 5 + 7)] \quad (3)$$

We rewrite (1) in the form:

$$2(2n^2) = 2 (2; 8; 18; 32) \quad (4)$$

Numerical dualities - Dyads from the Numerical Monads: 2; 8; 18; 32 are obtained.

We sum all Dyads (4) taking into account (2), (3) and the rule: "the amount does not change from the permutation of the places of the summands."

$$\begin{aligned} \Sigma 2 (2n^2) &= 2 \Sigma 2 \Sigma (2n - 1) = (2 \times 2) [(1) + (1 + 3) + (1 + 3 + 5) + (1 + 3 + 5 + 7)] = \\ &= 2 (2) + 2(2+6) + 2(2+6+10) + 2(2+6+10+14) = 2(2) + 2(6+2) + 2(10+6+2) + 2(14+10+6+2) \end{aligned}$$

The result is the total quantity of K_D numbers in the four Dyads from pairs (2 before parentheses) of the Monads, which are sequentially divided into 1, 2, 3, and 4 summands (in parentheses). In sum they are:

$$K_D = 2 (2) + 2(6 + 2) + 2(10 + 6 + 2) + 2(14 + 10 + 6 + 2) = 120 \quad (5)$$

With allowance for (3), formula (4) can be written as a sequence of the number of K_N numbers in the Monads of the sequence $n = 1; 2; 3; 4$ Dyads:

$$K_N = 2(2n^2) = 2[2(1), 2(3+1), 2(5+3+1), 2(7+5+3+1)] \quad (6)$$

Summarizing and expanding the brackets on the right-hand side of formula (6), we obtain the distribution of the quantity K_N for the numbers N in $n = 1; 2; 3; 4$ Dyads:

n = 1	n = 2	n = 3	n = 4
2, 2;	6, 2, 6, 2;	10, 6, 2, 10, 6, 2;	14, 10, 6, 2, 14, 10, 6, 2

This is the quantity of numbers, not numbers. All K_N values are even. Therefore it is possible to construct a geometric embodiment of formulas (5) and (6) in the form of a vertically symmetric sequence of 20 rows of square cells of 8 Monads for 1-120 numbers N in $n = 1; 2; 3; 4$ Dyad -Levels from top to bottom:

[illegible]

Fig. 1. Vertically symmetric 4-level distribution of squares for 1-120 numbers in 20 rows of 8 Monads according to the formula (6).

Rows 1, 2, 4, 6, 9, 12, 16, 20 consist of 2 cells, rows 3, 5, 8, 11, 15, 19 - of 6 cells, rows 7- of 10, 14, 18 - of 10 cells, rows 13, 17 - of 14 cells. In general, the shape with cells resembles a branchy Christmas tree. Rows with two cells look like the trunk of the Christmas tree. Obviously, the trunk is different from the branches. And the first branches of the Levels $n = 2; 3; 4$ different from each other. Thus, the Christmas tree is made up of a trunk and three different branches. These differences reflect the tones of the gray scale.

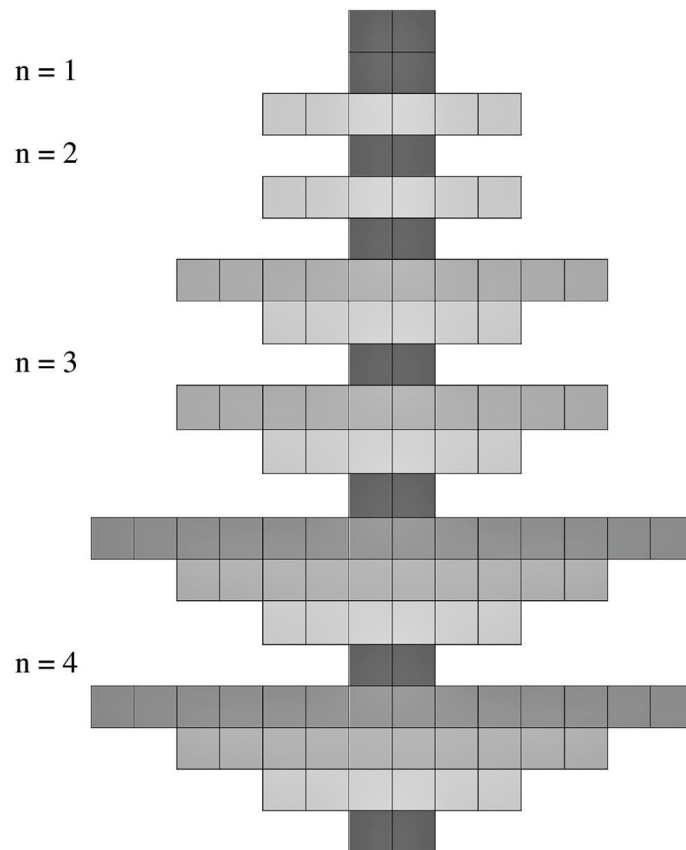


Fig. 2. Cells of the Christmas tree in different tones of a gray scale.

The first row of the first Dyad of two cells specifies the uniformity of the stem cells of the first type in the remaining lower seven rows. The third row (the first row in the second Dyad) specifies the six-cell first type of the Christmas tree branch in the underlying five-row series. The seventh row (the first row in the third Dyad) specifies

the ten-cell second type of the Christmas tree branch in the underlying three similar rows. The thirteenth row (the first row in the fourth Dyad) specifies the fourteen-quarter fourth type of the Christmas tree branch in the underlying row. Thus, the first rows with 2, 6, 10, 14 cells are typical for the underlying rows, and all 120 cells are naturally divided into 4 types.

Let us numbering the cells sequentially from left to right in rows with a successive transition to successive rows from top to bottom. In this case, the numbers $n = 1, 2, 3, 4$ of the Dyad-Levels and rows 1-20, fixed in Fig. 1 and the numbers of the Dyad-Levels in Fig. 2, are omitted.

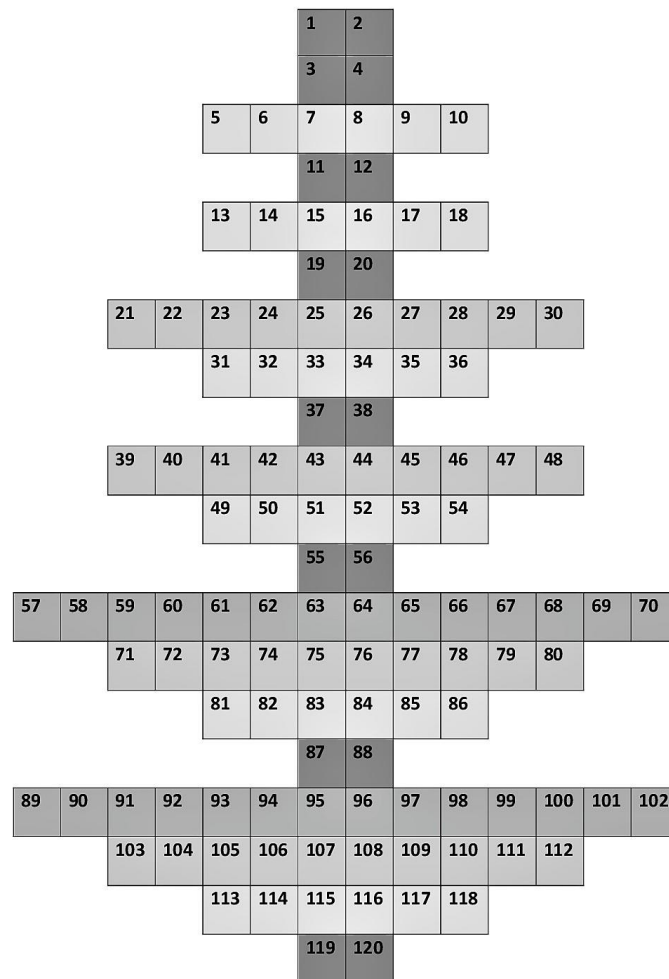


Fig. 3. Sequential and continuous numbering of the cells in Fig. 2.

In accordance with the division of cells into four types and the sequence of numbers 1-120 is distributed according to these four types.

2. Brushing a branched Christmas tree into a compact form

The Christmas tree shape in Fig. 3 (let's call Tree 1) can be reversibly folded into a compact form. But the direct reception of a compact form from Tree 1 is difficult. An intermediate form (Tree 2) is required, from which a transition to a compact form can be made. The transition from the Tree 1 to the Tree 2 is carried out by permutations of the rows of the lower Monads of the Dyad on Levels 2, 3, 4, which do not violate the rule: from the permutation of the places of the terms (series) the sum does not change:

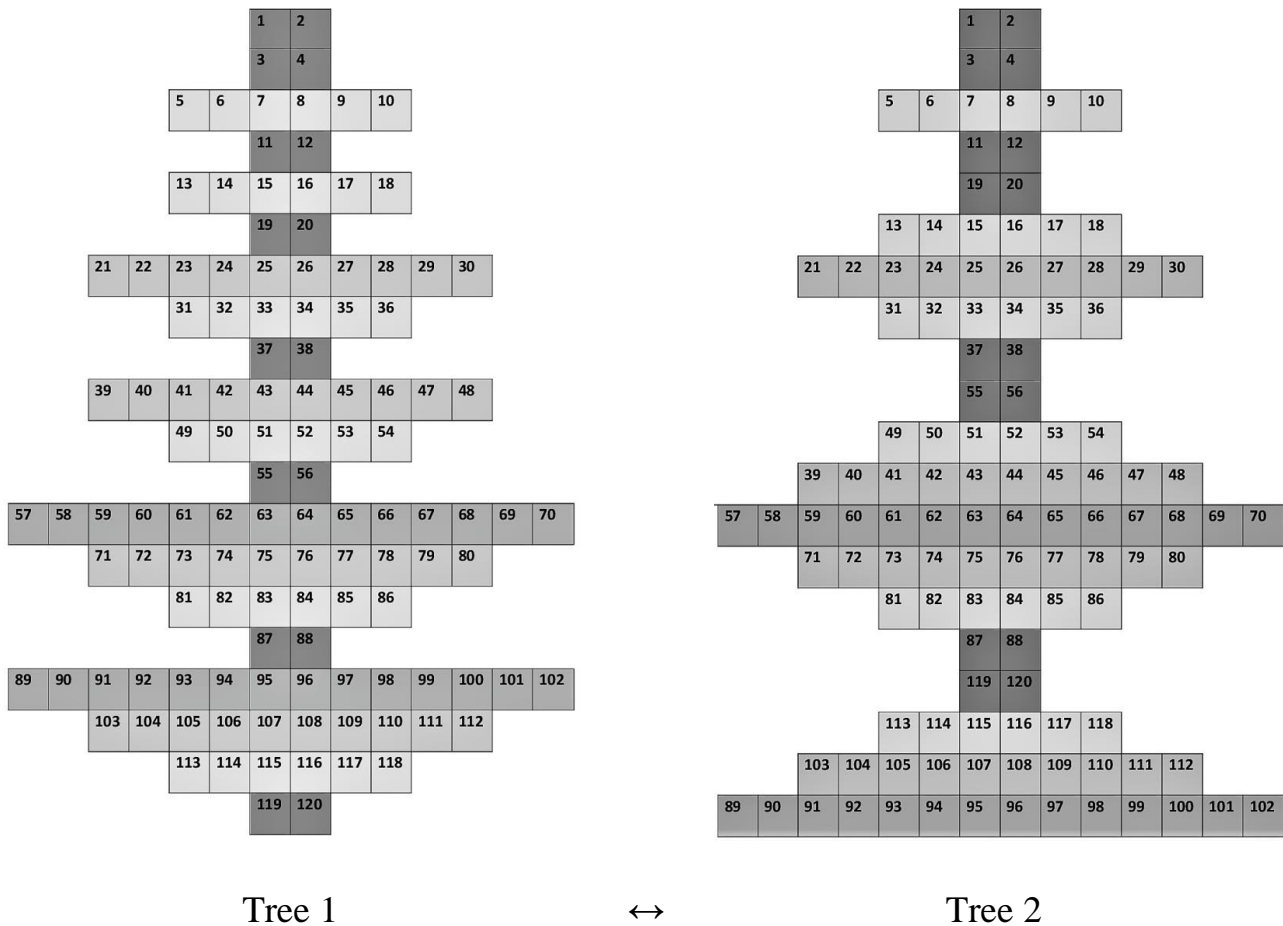


Fig. 4. Translation of the Christmas tree into a less branched form.

The first Dyad in the Tree 2 is already in the compact form of the Square 2×2 of the 4 squares with the numbers: 1,2,3,4. The Square 2×2 can be considered as square layer of the first type bordering the inner Square with the side equal to 0. Squares with squares-cells will be written with the capital letter S. In the second Dyad of Tree, 2 cells with the numbers 5, 10 and 13, 16 are moved so that formed a second type of a square layer of 16 cells, bordering the first type of a square layer of cells with the numbers: 11, 12 and 19, 20.

In the third Dyad, the cells numbered 31, 36 and 49, 54 are moved so that a second type of a square layer of 16 cells is formed, bordering the first type of a square layer of cells with numbers: 37, 38 and 55, 56. Cells with numbers 21, 22 , 23, 28, 29, 30 and cells with numbers 39, 40, 41, 46, 47, 48 are moved so that a third type of a square layer of 20 squares bordering the second type of a square layer is formed.

In the fourth Dyad, the cells with numbers 81, 86 and 113, 118 are moved so that a second type of square layer is formed bordering the first type of a square layer of cells with numbers 87, 88, 119, 120. The cells with numbers 71, 72, 73 and 103, 104, 105 are moved so that a third type of a square layer of 20 cells is formed, bordering the second type of a square layer. The cells with numbers 57-70, 89-102 are moved so that the fourth type of a square layer with numbers 57-70, 89-102, bordering the third type of a square layer is formed.

As a result of these transfers, we obtain the fold of the branched Christmas tree into a compact figure of 2×2 , 4×4 , 6×6 , and 8×8 squares resembling the Monument [1].

		1	2				
		3	4				
	6	7	8	9			
	5	11	12	10			
	13	19	20	18			
	14	15	16	17			
23	24	25	26	27	28		
22	32	33	34	35	29		
21	31	37	38	36	30		
39	49	55	56	54	48		
40	50	51	52	53	47		
41	42	43	44	45	46		
60	61	62	63	64	65	66	67
59	73	74	75	76	77	78	68
58	72	82	83	84	85	79	69
57	71	81	87	88	86	80	70
89	103	113	119	120	118	112	102
90	104	114	115	116	117	111	101
91	105	106	107	108	109	110	100
92	93	94	95	96	97	98	99

Fig. 5. The Monument of 1-120 cells in the Squares of 2×2 , 4×4 , 6×6 , 8×8 .

The typification of the numbered cells with tones of the gray scale in Fig. 3 is preserved, but not in linear rows, and in 4 concentrically closed square layers.

3. Non-periodic distribution of 1-120 number-numbers

The vertical sequence of 2×2 , 4×4 , 6×6 , 8×8 Squares from top to bottom in Fig. 5 on a reduced scale, we translate them into a horizontal sequence from left to right:

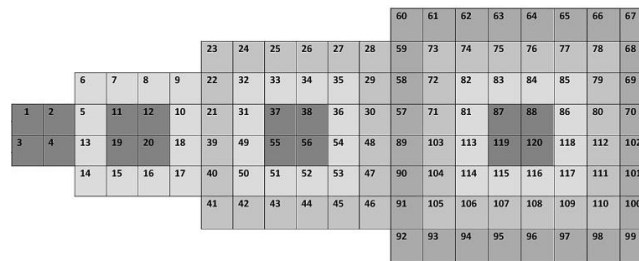


Fig. 6. The horizontal sequence of Squares is 2×2 , 4×4 , 6×6 , 8×8 .

Spread the upper and lower halves of Squares 2×2 , 4×4 , 6×6 , 8×8 into a continuous chain along the median horizontal line:

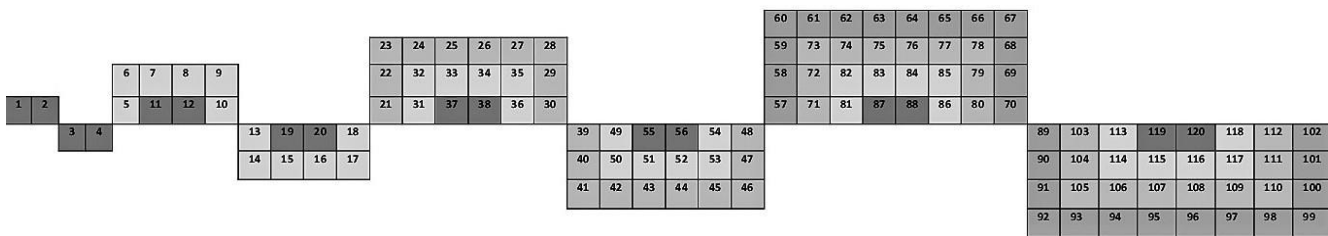


Fig. 7. A continuous chain of half squares of 2×2 , 4×4 , 6×6 , 8×8 .

The sequence of "waves of rectangular pulses" was obtained with the argument increasing by 4 units, and the amplitude by 1 unit with each subsequent "wave". There is

no defining feature of periodicity - the constancy of the period. Therefore, such a sequence is not periodic in the strict scientific definition of periodicity.

Tree Dyadic (Fig. 3.) and the Monumental Square (Fig. 5) distribution of numbered cells exclusively of mathematical (theoretical) origin, construction and content. They can be effective for different sets of objects of the real World, both artificial and natural. For example, in artificial constructions such an effective wedge-shaped system of fighters, subunits, combat vehicles, tanks, ships, aircraft, military units for the breakthrough of the enemy's front can be such. For natural objects, we can compare them with the distribution of chemical elements, which today are 118 numbered objects with their own names and symbols.

4. Mathematical classification and typification of chemical elements

The cells with the numbers in Fig. 3 and Fig. 5 we supplement the symbols of the corresponding chemical elements [2]. All existing chemical elements are assigned to the 4 blocks: s, p, d, f. Cells with chemical elements of these blocks are usually discolored with red, orange, blue and green colors, respectively.

In the following Fig. 8 and Fig. 9 is a numeric Christmas tree in Fig. 3 and numeric Monument in Fig. 5 with chemical symbols in the colors of cells s, p, d, f blocks. According to the logic of formulas (5) and (6), the elements 119 and 120 must be s-elements. But they are not yet discovered and synthesized. Cells with these elements are not colored in red, but in a dark red color.

				H 1	He 2						
				Li 3	Be 4						
		B 5	C 6	N 7	O 8	F 9	Ne 10				
				Na 11	Mg 12						
		Al 13	Si 14	P 15	S 16	Cl 17	Ar 18				
				K 19	Ca 20						
Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30		
		C 31	Ge 32	As 33	Se 34	Br 35	Kr 36				
				Rb 37	Sr 38						
Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48		
		In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54				
				Cs 55	Ba 56						
La 57	Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68
		Lu 71	Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Au 79	Hg 80
				Tl 81	Pb 82	Bi 83	Po 84	At 85	Rn 86		
				Fr 87	Ra 88						
Ac 89	Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100
		Lr 103	Rf 104	Db 105	Sg 106	Bh 107	Hs 108	Mt 109	Ds 110	Rg 111	Cn 112
				Nh 113	Fl 114	Mc 115	Lv 116	Ts 117	Og 118		
						119	120				

Fig.8. Numeric Tree in Fig. 3 with symbols of chemical elements in s, p, d, f color cells.

				H 1	He 2						
				Li 3	Be 4						
		C 6	N 7	O 8	F 9						
		B 55	Na 11	Mg 12	Ne 10						
		Al 13	K 19	Ca 20	Ar 18						
		Si 14	P 15	S 16	Cl 17						
V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28						
Ti 22	Ge 32	As 33	Se 34	Br 35	Cu 29						
Sc 21	Ga 31	Rb 37	Sr 38	Kr 36	Zn 30						
Y 39	In 49	Cs 55	Ba 56	Xe 54	Cd 48						
Zr 40	Sn 50	Sb 51	Te 52	I 53	Ag 47						
Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46						
Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67				
Pr 59	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Er 68				
Ce 58	Hf 72	Pb 82	Bi 83	Po 84	At 85	Au 79	Tm 69				
La 57	Lu 71	Tl 81	Fr 87	Ra 88	Rn 86	Hg 80	Yb 70				
Ac 89	Lr 103	Nh 11	119	120	Og 118	Cn 112	No 102				
Th 90	Rf 104	Fl 114	Mc 115	Lv 116	Ts 117	Rg 111	Md 101				
Pa 91	Db 105	Sg 106	Bh 107	Hs 108	Mt 109	Ds 110	Fm 100				
U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99				

Fig. 9. Numeric Monument in Fig. 5 with symbols of chemical elements in s, p, d, f color cells

Sections 1. and 2. culminated in the identification of four types of cells, which were recorded by different tones of the gray scale. Consider jointly the Numeric Tree (Fig. 3), the Numeric Monument (Fig.5), the Tree of Chemical Elements (Fig. 8) and the Monument of the Chemical Elements (Fig. 9).

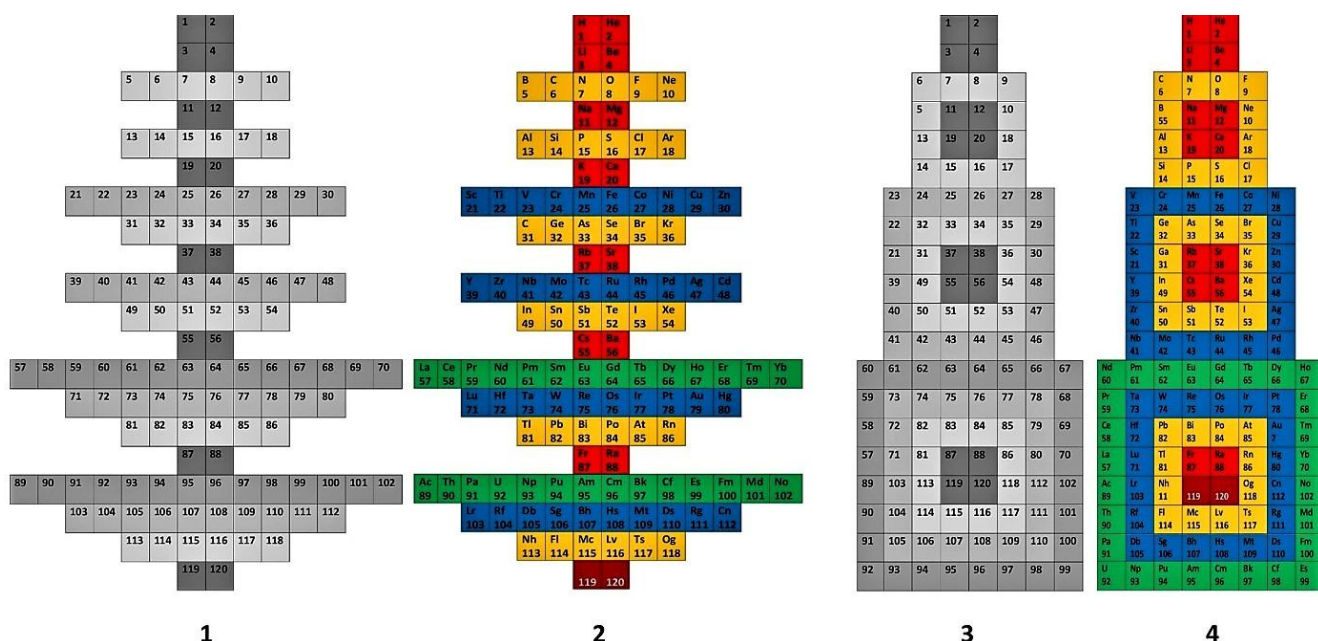


Fig. 10. A joint view of Fig. 3, Fig. 8 and Fig. 5, Fig. 9.

In the Christmas tree distribution of chemical elements, the first pair of s-elements of the first level manifests its type setting role in that all pairs of "stem" elements are "red" s-elements. In the Monument of chemical elements, this type manifests itself as "red" squares in four concentric layers of four cells in the 2×2 , 4×4 , 6×6 , 8×8 Squares.

The first orange "branch" of the second level of the Tree of chemical elements sets the type of the remaining p-elements. In the Monument, all p-elements are located in the second concentric layers bordering the Squares of two pairs of s-elements.

The first "blue branch" of the third level of the Tree of chemical elements sets the type of the remaining branches of the d-elements. In the Monument, all d-elements are located in the third concentric layers bordering the second concentric layers of p-elements.

The first green "branch" of the fourth level of the Tree of chemical elements sets the type of the remaining 14 f-elements. In the Monument, all f-elements are located in the fourth concentric layer bordering the third concentric layer of d-elements.

Comparison of figures **1** to **2** and **3** to **4** in Fig. 10 shows the coincidence of typing cells in tones of gray scale and cells with colors of s, p, d, f blocks. Since the systematization and typification of cells numbered 1-120 in figures **1** and **3** with gray scale tones was performed exclusively mathematically, Figures **2** and **4** represent the mathematical Systematization and typification of chemical elements. Mathematical typing coincides with the quantum-mechanical typing of s, p, d, f blocks.

5. 4-Level Diadic Table of Chemical Elements

The cells in Fig. 8 are consistent, but with "voids" between Monads and Dyad. By compacting of a figure, i.e. reduction of the number of "voids" between Monads and Dyads, further, the expansion of squares to rectangles for the possibility of placing additional information (atomic masses, electronic structure, number of nucleons, ...), finally, placing in frames with the numbers of Levels and Groups, we can get 4 -Level Dyadic Table of chemical elements:

L E V E L S	G R O U P S													
			III	IV	Y	I	II	YI	YII	YIII				
		IX	X	XI	XII	XIII	XIV	XY	XYI	XYII	XYIII			
	XIX	XX	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	XXIX	XXX	XXXI	XXXII
1						H 1	He 2							
						Li 3	Be 4							
2			B 5	C 6	N 7	Na 11	Mg 12	O 8	F 9	Ne 10				
			Al 13	Si 14	P 15	K 19	Ca 20	S 16	Cl 17	Ar 18				
3		Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30			
			Ga 31	Ge 32	As 33	Rb 37	Sr 38	Se 34	Br 35	Kr 36				
		Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48			
			In 49	Sn 50	Sb 51	Cs 55	Ba 56	Te 52	I 53	Xe 54				
4	La 57	Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70
			Lu 71	Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Au 79	Hg 80		
				Tl 81	Pb 82	Bi 83	Fr 87	Ra 88	Po 84	At 85	Rn 86			
	Ac 89	Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102
			Lr 103	Rf 104	Db 105	Sg 106	Bh 107	Hs 108	Mt 109	Ds 110	Rg 111	Cn 112		
				Nh 113	Fl 114	Mc 115			Lv 116	Ts 117	Og 118			

Fig. 11. 4-Level Diadic Table of chemical elements.

At the top of the Table are three symmetric bands with Group numbers in cells of s-, p-, d-, f-colors, exactly matching the colors of the cells in the rows of these elements. The Groups XXXII, but the columns are only 14. The IUPAC Periodic Table has XVIII Groups and 18 columns.

The Group numbers in the colored cells of the three bands exactly indicate the analogical elements in all the columns of the Table. On the left side are the numbers of the Levels (Diad). There are only 4. Each Level consists of two quantitatively and configurationally identical halves. They are represented in Periodic Table IUPAC by Periods.

All the elements are located in one Table without internal empty cells, whereas in Table of IUPAC there are 36 internal empty cells at the top of the main Table, and lanthanides and actinides are placed in separate Tables. These are fundamental violations of the principle of continuity-integrity in the sequence of chemical elements laid down by D.I. Mendeleev as the main principle of the Systematization of chemical elements.

6. 4-Level Dyad-octave Table of chemical elements

In spite of the fact that IUPAC recommends the long-period XVIII Group Table of chemical elements since 1989, the overwhelming majority of educated people and specialists "remain faithful" to the short-period octave Table of chemical elements. It is actually more convenient for educational, scientific and practical use. The terms " $A^{\text{II}}B^{\text{VI}}$ ", " $A^{\text{III}}B^{\text{V}}$ ", ..., dual systems $A^{\text{II}} - B^{\text{VI}}$, $A^{\text{III}} - B^{\text{V}}$, ..., that arose during the period of wide use of Mendeleev's short-period octave Table have long been established in the educational and scientific literature.

By permutation of the cells d and f-elements in Fig. 11, without disrupting their continuous sequence in the series, a 4-Level Dyad-octave Table of chemical elements can be obtained (Fig. 12).

It turns out quite a lot of empty cells. But they are all external to series with cells of chemical elements and do not violate the principle of continuity-integrity. In the short-periodic Table and in the XVIIIth IUPAC Periodic Table empty cells are internal and they violate the principle of continuity in element sequences.

At the top of the table is a 5-row diagram of the sequence of Group numbers in cells of colors s, p, d, f blocks of chemical elements. These numbers refer only to the corresponding colors of the cells of the chemical elements, for example, red Groups I and II refer only to the chemical elements in the red cells from top to bottom, and to the green

Groups XIX - XXXII, only the corresponding lanthanides and actinides are related vertically. Copper with noble metals and Zinc Group found themselves in the same columns with Groups I and II, which brings this Table even closer to the short-period VIII-Groupic Mendeleev's Table.

L E V E L S	G R O U P S							
	III	IY	Y	I	II	YI	YII	YIII
	IX	X	XI	XII	XIII	XIV	XY	XYI
				XYII	XYIII			
	XIX	XX	XXI	XXII	XXIII	XXIV	XXV	XXVI
		XXVII	XXVIII	XXIX	XXX	XXXI	XXXII	
1				H 1	He 2			
				Li 3	Be 4			
2	B 5	C 6	N 7	Na 11	Mg 12	O 8	F 9	Ne 10
	Al 13	Si 14	P 15	K 19	Ca 20	S 16	Cl 17	Ar 18
3	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28
				Cu 29	Zn 30			
	Ga 31	Ge 32	As 33	Rb 37	Sr 38	Se 34	Br 35	Kr 36
	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46
				Ag 47	Cd 48			
	In 49	Sn 50	Sb 51	Cs 55	Ba 56	Te 52	I 53	Xe 54
	La 57	Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64
		Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70	
4	Lu 71	Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78
				Au 79	Hg 80			
	Tl 81	Pb 82	Bi 83	Fr 87	Ra 88	Po 84	At 85	Rn 86
	Ac 89	Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96
		Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102	
	Lr 103	Rf 104	Db 105	Sg 106	Bh 107	Hs 108	Mt 109	Ds 110
				Rg 111	Cn 112			
	Nh 113	Fl 114	Mc 115	119	120	Lv 116	Ts 117	Og 118

Fig. 12. 4-Level Dyad-octave Table of chemical elements.

7. 4-Level Monumental Octave System of Chemical Elements

The monument with extended cells within the frames of the Levels and Groups numbers represents a non-periodical, but 4-Level Monumental octave Table of chemical elements:

L E V E L S	G R O U P S							
	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	XXIX
	XXI	XI	XII	XIII	XIV	XV	XVI	XXX
	XX	X	IY	Y	YI	YII	XYII	XXXI
	XIX	IX	III	I	II	YII	XYIII	XXXII
	XIX	IX	III	I	II	YII	XYIII	XXXII
	XX	X	IY	Y	YI	YII	XYII	XXXI
	XXI	XI	XII	XIII	XIV	XV	XYI	XXX
	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	XXIX
1				H 1	He 2			
				Li 3	Be 4			
2			C 6	N 7	O 8	F 9		
			B 5	Na 11	Mg 12	Ne 10		
			Al 13	K 19	Ca 20	Ar 18		
			Si 14	P 15	S 16	Cl 17		
3		V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	
		Ti 22	Ge 32	As 33	Se 34	Br 35	Cu 29	
		Sc 21	Ga 31	Rb 37	Sr 38	Kr 36	Zn 30	
		Y 39	In 49	Cs 55	Ba 56	Xe 54	Cd 48	
		Zr 40	Sn 50	Sb 51	Te 52	I 53	Ag 47	
		Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	
4	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67
	Pr 59	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Er 68
	Ce 58	Hf 72	Pb 82	Bi 83	Po 84	At 85	Au 79	Tm 69
	La 57	Lu 71	Tl 81	Fr 87	Ra 88	Rn 86	Hg 80	Yb 70
	Ac 89	Lr 103	Nh 113	119	120	Og 118	Cn 112	No 102
	Th 90	Rf 104	Fl 114	Mc 115	Lv 116	Ts 117	Rg 111	Md 101
	Pa 91	Db 105	Sg 106	Bh 107	Hs 108	Mt 109	Ds 110	Fm 100
	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99

Fig. 13. 4-Level Monumental octave Table of chemical elements.

Conclusions

1. The deductive mathematical distribution of natural numbers in the Squares of the first four even numbers led to their Dyadic, in particular, to the 4-level Diadic distribution of the first 120 natural numbers. Number of quantity numbers in the mathematical (arithmetic) progression increases from Dyad to Dyad. This deductively revealed numerical distribution Law applied to inductively (experimentally) discovered chemical elements over a period of two centuries is an expression of the mathematical theory of the Law of the order distribution of chemical elements in their entire set.

2. . The Law is expressed by the general formula:

$$N = (2n)^2 = 2 \sum 2 \sum (2n-1)$$

in numerical expansions (5) and (6) for the total quantity of numbers and their sequential numbering in Fig. 1-3 for $n = 1, 2, 3, 4$.

3. The Law of ordinal distribution of natural numbers contained in squares of even numbers and their typification corresponds to the experimental ordinal distribution of chemical elements and their quantum-mechanical typification.

4. The Law is embodied in non-periodic symmetric continuous-integral two 4-Level Dyadic Tables (Fig. 11, Fig. 12) from the Level-Dyad and 4-Level Monumental Table (Fig. 13) from the Square-Levels.

5. 4-Level Tables represent mathematical Level Systems of chemical elements.

In the world scientific literature the similar works of other authors is not revealed. Therefore, only the main authors's works published earlier are listed in the references.

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