

BAYEH's theoretical periodic table of elements

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Abstract: The “BAYEH's theoretical periodic table of elements” is an original study introduced by the author in Chemistry in 2004. In the past, many scientists and researchers have developed number of periodic tables of elements in order to arrange the atomic elements in the right Columns and groups. The main target was to facilitate the understanding and visualize the atomic elements with some information, but till now no one has developed an ideal theoretical periodic table that can arrange and contain all atomic elements even if they don't exist in the nature in a sequence of blocks, sequence of atomic numbers and sequence of quantum theory. In this paper the author develop a theoretical periodic table using original theoretical methods and formulae in order to create the ideal theoretical periodic table of elements.

Keywords: Periodic table, 3D periodic table, quantum number, orbital.

1. Introduction

In the past, many scientists and researchers have developed number of periodic tables of elements in order to arrange the atomic elements in the right Columns and groups [1-6]. The modern periodic table is based on quantum numbers and blocks, many problems faced the scientists and researchers when arranging the elements in the traditional and modern periodic tables as placing some elements in the incorrect place as (He) Helium, (La) Lanthanide and many others elements. In addition to that, the relation and sequences do not exist even in the modern periodic tables that are based on the quantum theory. For these reasons and many others reasons, the author develop a new periodic table based on quantum theory, to emphasis the relation between blocks and atomic numbers in very organized sequences, and arranged in a spiral sequence from the first atom (H) hydrogen to an unlimited atoms numbers. In this paper, the new concept of the Bayeh's theoretical table of element is introduced and few examples are shown and discussed briefly. Figures are drawn with AutoCAD. The Concept of the BAYEH's Theoretical periodic table of Elements is presented in section 2. In the third section, some Advantages of the new periodic table are presented and discussed briefly. Disadvantage of other existing periodic table is presented and discussed briefly in section 4. In the fifth section, a 3D Bayeh's theoretical periodic table is presented. In the sections 6, a Sample of Existing 3D periodic table is presented. Samples of existing periodic tables are presented in the section 7. Finally, a conclusion about the BAYEH's Theoretical periodic table of Elements is presented in the section 8.

2. Sample of Existing 3D periodic table

These periodic tables are made by Roy Alexander. These are based on the old and standard periodic table, and the disadvantages of both tables are discussed in the section 4 of this article [8].

Extended Periodic Table

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	Ga 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	Lu 59	Hf 60	Ta 61	W 62	Re 63	Os 64	Ir 65	Pt 66	Au 67	Hg 68	Tl 69	Pb 70	Bi 71	Po 72	At 73	Rn 74																																																				
Fr 87	Ra 88	Ac 89	Th 90	La 91	Ce 92	Pr 93	Nd 94	Pm 95	Sm 96	Eu 97	Gd 98	Tb 99	Dy 100	Ho 101	Er 102	Tm 103	Yb 104	Lu 105	Hf 106	Ta 107	W 108	Re 109	Os 110	Ir 111	Pt 112	Au 113	Hg 114	Tl 115	Pb 116	Bi 117	Po 118	At 119	Rn 120																																						
Uue 119	Ubn 120	Ubu 121	Ubb 122	Ubt 123	Ubu 124	Ubn 125	Ubu 126	Ubb 127	Ubt 128	Ubu 129	Ubn 130	Ubu 131	Ubb 132	Ubt 133	Ubu 134	Ubn 135	Ubu 136	Ubb 137	Ubt 138	Ubu 139	Ubn 140	Ubu 141	Ubn 142	Ubu 143	Ubb 144	Ubt 145	Ubu 146	Ubn 147	Ubu 148	Ubb 149	Ubt 150	Ubu 151	Ubn 152	Ubu 153	Ubn 154	Ubu 155	Ubn 156	Ubu 157	Ubn 158	Ubu 159	Ubn 160	Ubu 161	Ubn 162	Ubu 163	Ubn 164	Ubu 165	Ubn 166	Ubu 167	Ubn 168	Ubu 169	Ubn 170	Ubu 171	Ubb 172	Ubt 173	Ubu 174	Ubn 175	Ubu 176	Ubn 177	Ubu 178	Ubn 179	Ubu 180	Ubn 181	Ubu 182	Ubn 183	Ubu 184	Ubn 185	Ubu 186	Ubn 187	Ubu 188	Ubn 189	Ubu 190
Uhe 169	Uusn 170	Uusu 171	Uusb 172	Uust 173	Ubn 174	Ubu 175	Ubn 176	Ubu 177	Ubn 178	Ubu 179	Ubn 180	Ubu 181	Ubn 182	Ubu 183	Ubn 184	Ubu 185	Ubn 186	Ubu 187	Ubn 188	Ubu 189	Ubn 190	Ubu 191	Ubn 192	Ubu 193	Ubn 194	Ubu 195	Ubn 196	Ubu 197	Ubn 198	Ubu 199	Ubn 200	Ubu 201	Ubn 202	Ubu 203	Ubn 204	Ubu 205	Ubn 206	Ubu 207	Ubn 208	Ubu 209	Ubn 210	Ubu 211	Ubn 212	Ubu 213	Ubn 214	Ubu 215	Ubn 216	Ubu 217	Ubn 218	Ubu 219	Ubn 220																				

lanthanideseries Pr 59, Nd 60, Pm 61, Sm 62, Eu 63, Gd 64, Tb 65, Dy 66, Ho 67, Er 68, Tm 69, Yb 70

actinideseries Pa 91, U 92, Np 93, Pu 94, Am 95, Cm 96, Bk 97, Cf 98, Es 99, Fm 100, Md 101, No 102

superactinideseries Uqu 141, Uqg 142, Uqq 143, Uqp 144, Uqs 145, Uqo 146, Uqe 147, Uqn 148, Uqj 149, Uqm 150, Uqu 151, Uqb 152

eka-superactinide Ueu 191, Ueb 192, Uet 193, Ueq 194, Uep 195, Ueh 196, Ues 197, Ueo 198, Uee 199, Bnn 200, Bnu 201, Bnb 202

Ubb-series Ubq 124, Ubp 125, Ubh 126, Ubs 127, Ubo 128, Ube 129, Ubn 130, Ubu 131, Ubt 132, Utt 133, Utq 134, Utp 135, Uth 136, Uts 137, Uto 138, Ute 139, Uqn 140

Usb-series Usq 174, Usp 175, Ush 176, Uss 177, Uso 178, Use 179, Uon 180, Uou 181, Uob 182, Uot 183, Uoq 184, Uop 185, Uoh 186, Uos 187, Uoo 188, Uoe 189, Uen 190

Figure 1.3: Example of Extended Periodic table [8].

χ	s ¹	s ²	p ¹	p ²	p ³	p ⁴	p ⁵	p ⁶	d ¹	d ²	d ³	d ⁴	d ⁵	d ⁶	d ⁷	d ⁸	d ⁹	d ¹⁰	f ¹	f ²	f ³	f ⁴	f ⁵	f ⁶	f ⁷	f ⁸	f ⁹	f ¹⁰	f ¹¹	f ¹²	f ¹³	f ¹⁴	g ¹	g ²	g ³	g ⁴	g ⁵	g ⁶	g ⁷	g ⁸	g ⁹	g ¹⁰	g ¹¹	g ¹²	g ¹³	g ¹⁴	g ¹⁵	g ¹⁶	g ¹⁷	g ¹⁸																						
1s	H 1	He 2																																																																						
2s	Li 3	Be 4																																																																						
3s	Na 11	Mg 12																																																																						
4s	K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30																																																												
5s	Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48																																																												
6s	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	Tm 69	Yb 70																																																								
7s	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	Md 101	No 102																																																								
8s	Uue 119	Ubn 120	Ubu 121	Ubb 122	Ubt 123	Ubu 124	Ubn 125	Ubu 126	Ubb 127	Ubt 128	Ubu 129	Ubn 130	Ubu 131	Ubb 132	Ubt 133	Ubu 134	Ubn 135	Ubu 136	Ubb 137	Ubt 138	Ubu 139	Ubn 140	Ubu 141	Ubn 142	Ubu 143	Ubb 144	Ubt 145	Ubu 146	Ubn 147	Ubu 148	Ubn 149	Ubu 150	Ubn 151	Ubu 152	Ubn 153	Ubu 154	Ubn 155	Ubu 156	Ubn 157	Ubu 158	Ubn 159	Ubu 160	Ubn 161	Ubu 162	Ubn 163	Ubu 164	Ubn 165	Ubu 166	Ubn 167	Ubu 168	Ubn 169	Ubu 170	Ubn 171	Ubu 172	Ubn 173	Ubu 174	Ubn 175	Ubu 176	Ubn 177	Ubu 178	Ubn 179	Ubu 180	Ubn 181	Ubu 182	Ubn 183	Ubu 184	Ubn 185	Ubu 186	Ubn 187	Ubu 188	Ubn 189	Ubu 190
9s	Uhe 169	Uusn 170	Uusu 171	Uusb 172	Uust 173	Ubn 174	Ubu 175	Ubn 176	Ubu 177	Ubn 178	Ubu 179	Ubn 180	Ubu 181	Ubn 182	Ubu 183	Ubn 184	Ubu 185	Ubn 186	Ubu 187	Ubn 188	Ubu 189	Ubn 190	Ubu 191	Ubn 192	Ubu 193	Ubn 194	Ubu 195	Ubn 196	Ubu 197	Ubn 198	Ubu 199	Ubn 200	Ubu 201	Ubn 202	Ubu 203	Ubn 204	Ubu 205	Ubn 206	Ubu 207	Ubn 208	Ubu 209	Ubn 210	Ubu 211	Ubn 212	Ubu 213	Ubn 214	Ubu 215	Ubn 216	Ubu 217	Ubn 218	Ubu 219	Ubn 220																				

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Figure 1.4: Example of Modern Periodic table [8].

4. Concept of the BAYEH's Theoretical periodic table of Elements

In order to proceed with the new theoretical periodic table, it is necessary to define some important theories and terms that are used to form this theoretical periodic table.

4.1 Bayeh's theory behind the periodic table

The main target (purpose) of the new theory introduced, is to get all information about the atom by knowing only its atomic number. By using new formulae developed, one can know the period, group, orbital behavior, filling orbital, the number of electron on the outer shell, the sequence of the electron configuration and the ground state electron configuration. On the other hand, one can guess immediately the position of the atom in the periodic table.

In this section, only the basic of the theory is introduced, the complete theory will be developed in a separate paper.

•The general formula of the ground state electron configuration introduced by the author is as the following

$$nS^2 \left[\begin{array}{l} \rightarrow 2 \\ \left[\begin{array}{l} \rightarrow n \\ jA_i^{4i-2} \\ j = \frac{n+n;P;(2)/(3)}{2} \\ i = \frac{n+n;P;(2)/(1)}{2} \end{array} \right] \end{array} \right] \quad (1)$$

For example, for n=11 the complete configuration will be as the following

$$11S^2 \left[\begin{array}{l} \rightarrow 2 \\ \left[\begin{array}{l} \rightarrow 11 \\ jA_i^{4i-2} = 11S^2 7A_6^{22} 8A_5^{18} 9A_4^{14} 10A_3^{10} 11A_2^6 = 11S^2 7H^{22} 8G^{18} 9F^{14} 10D^{10} 11P^6 \\ j=7 \\ i=6 \end{array} \right] \end{array} \right]$$

•The relation between the atomic number (Z) and the period of the element

$$Z = 2 + 2 \sum_2^N i^2 p \quad (2)$$

•The number of the electron in the outer shell (peripheral electrons) = $Z - (2 + 2 \sum_2^{N-1} i^2 p)$ (3)

The 3 formulae (1), (2), and (3) developed are the basis of the periodic table that gives the necessary information about the atom in order to place it in the correct box in the table.

All these formulae are introduced by the author and they are original formulae that don't exist before.

•Let's take an example:

Consider the following atom with Z=365 (Thp) named "Tri-Hex-Pentium"

$$Z = 2 + 2 \sum_2^N i^2 p \rightarrow 365 = 2 + 2 \sum_2^N i^2 p \rightarrow \sum_2^N i^2 p = \frac{365 - 2}{2} = 181.5$$

$$\Rightarrow \begin{cases} 2 \cdot 2^2 + 2 \cdot 3^2 + 2 \cdot 4^2 + 2 \cdot 5^2 + 2 \cdot 6^2 = 180 < 181.5 \\ 2 \cdot 2^2 + 2 \cdot 3^2 + 2 \cdot 4^2 + 2 \cdot 5^2 + 2 \cdot 6^2 + 7^2 = 229 > 181.5 \end{cases}$$

$\Rightarrow i=7$ and $p=1$ then the period is even $\rightarrow n = 2(i - 1) = 2(N - 1) \Rightarrow n=12$ the period of the element ($Z=365$)

•The number of the electron in the outer shell=

$$Z - (2 + 2 \sum_2^6 i^2 p) = 365 - (2 + 2(2 \cdot 2^2 + 2 \cdot 3^2 + 2 \cdot 4^2 + 2 \cdot 5^2 + 2 \cdot 6^2))$$

$$= 365 - (2 + 2 \cdot 2(2^2 + 3^2 + 4^2 + 5^2 + 6^2)) = 3 \text{ electron in the outer shell}$$

•The ground state electron configuration:

$$nS^2 \left[\begin{array}{c} \rightarrow 2 \\ \left[\begin{array}{c} \rightarrow n \\ jA_i^{4i-2} \\ j = \frac{n+n; P; (2)/(3)}{2} \\ i = \frac{n+n; P; (2)/(1)}{2} \end{array} \right] \end{array} \right] = nS^2 \left[\begin{array}{c} \rightarrow 2 \\ \left[\begin{array}{c} \rightarrow n \\ jA_i^{4i-2} = 12S^2 \\ j = \frac{n+2}{2} \\ i = \frac{n+2}{2} \end{array} \right] \end{array} \right] = 12S^2 \left[\begin{array}{c} \rightarrow 2 \\ \left[\begin{array}{c} \rightarrow 12 \\ jA_i^{4i-2} = 12S^2 7A_7^1 \\ j = 7 \\ i = 7 \end{array} \right] \end{array} \right]$$

A_7^1 {number of electron in the orbital A_7
Orbital A_7

Briefly the atom with $Z=365$ is positioned in the period $n=12$ and in the group A_7^1

4.2 Reading the Periodic table

- The horizontal boxes describe the period of the elements (Period 1, 2, 3...) (refer to “figure 2.2”)
- The vertical boxes describe the group of the elements according to the quantum theory.
- The colored boxes are elements grouped by family type for example: Nobles gases colored in blue contains the following elements (He, Ne, Ar, Kr...) (refer to “figure 2.3” for the legend)
- The sequence of the atomic number begin in order from the lowest to the highest atomic number i.e.: H(1), He(2), Li(3)... the form of the sequence can be described as a spiral form (refer to “figure 3.2”).
- All elements are grouped by blocks respectively from the left to the right and from the lowest to the highest orbital (S, P, D, F, G, H...) (refer to “figure 3.1”)
- The groups are renamed according to the new method introduced by the author as above. A_i^j with i represents the orbital number i.e.: $A_1 = S; A_2 = P; A_3 = D; A_4 = F \dots$ and j represents the theoretical group of the element according to the filling orbital.
- The Helium element (He) is placed in the A_1^2 (or S_2) group according to its orbital properties that is similar to all elements in the same column or group.

Figure 2.1 : Extract part from the Bayeh's periodic table.

Figure 2.2 : More close from the Bayeh's periodic table presenting first elements

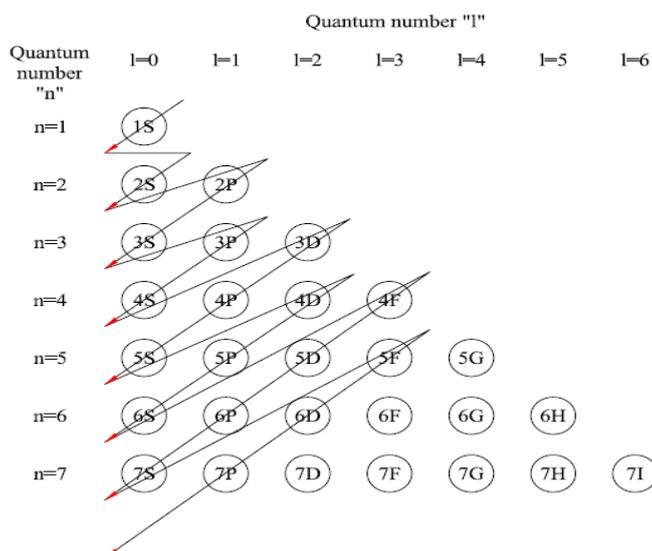
LEGEND

NATURE OF THE ELEMENT		Nomenclature		
		Number	Prefix	Letter
*	HALOGENS	0	nil	n
	TRANSITION METALS METAUX DE TRANSITION	1	un	u
		2	bi	b
		3	tri	t
		4	quad	q
		5	pent	p
		6	hex	h
		7	sept	s
		8	oct	o
		9	en	e
	ACTINIDES			
	LANTHANIDES			
	OTHER METALS METAUX PAUVRES			
	ALKALINE EARTH METALS METAUX ALCALINO-TERREUX			
	ALKALINE METALS (ALKALI METALS) METAUX ALCALINS			
	NOBLE GASES GAZ NOBLES			
	NON METAL (NON METAUX)			
	METALLOIDS SEMI CONDUCTEUR			
		NOTATION		
		$aS^b = aA_1^b$		
		$aP^b = aA_2^b$		
		$aD^b = aA_3^b$		
		$aF^b = aA_4^b$		
		$aG^b = aA_5^b$		
		$aH^b = aA_6^b$		
			

Figure 2.3 : Legend of the periodic table

5. Advantages of the new periodic table

- This periodic table is based on theoretical methods of quantum theory in which it gives the ideal position of an element in the table. All errors in the nature are not considered in this periodic table.
- It is based on quantum numbers and blocks
- The periodic table is constructed by listing the elements by *n* and *l* quantum number. (Refer to “figure 3”)
- The blocks begin from the left to the right in order (S-block, P-block, D-block, F-block...) (Refer to “figure 3.1”)
- The relation between blocks and atomic numbers exist with an uninterrupted sequence. (Refer to “figure 3.2”)
- All atomic numbers can be easily placed in the correct place by knowing their period and their orbital.
- The periodic table is constructed by listing the elements by *n* and *l* quantum number.



- There is no a definite sequence that relate all blocks and atomic numbers in a right way without interruption.
- The relation between blocks and atomic numbers exist with interrupted sequence.

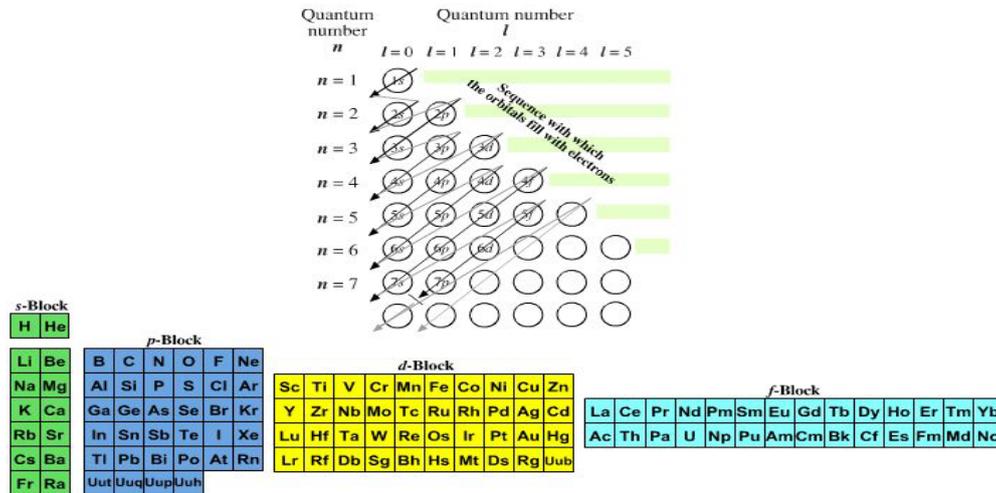


Figure 4.1: modern periodic table arranged by sequence Blocks [8].

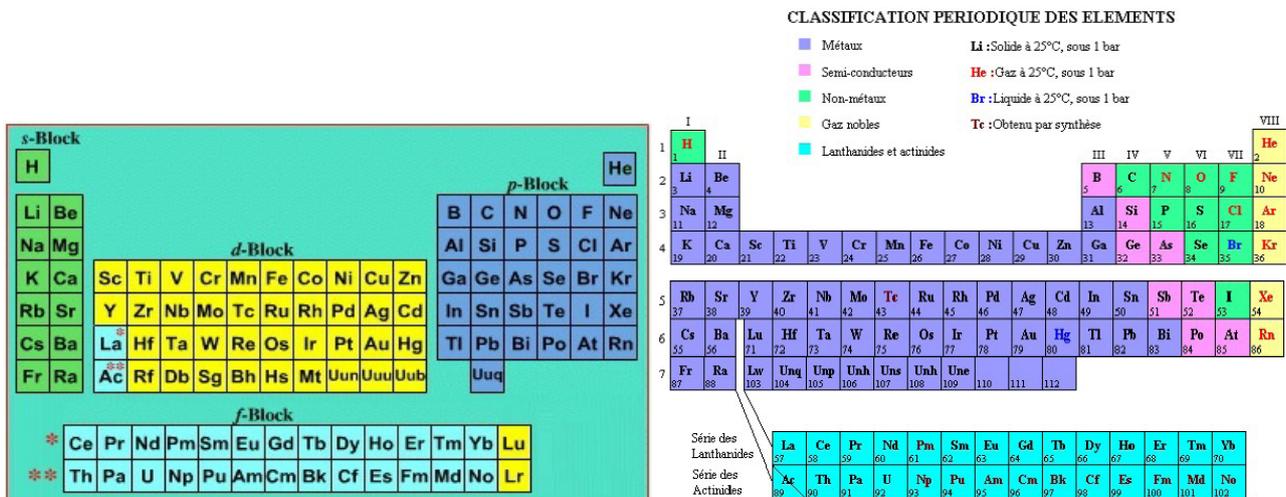


Figure 4.2: Mendeleiev version for periodic table with common error [8].

7. Bayeh's theoretical periodic table in three dimensional (3D) version

The studied Periodic table can be arranged in a 3D shape, the shape is similar to a scale that begins from the top and contains the S-Block, the second step is the P-Block, and the third step is the D-Block and so on... (Refer to "figure 5")

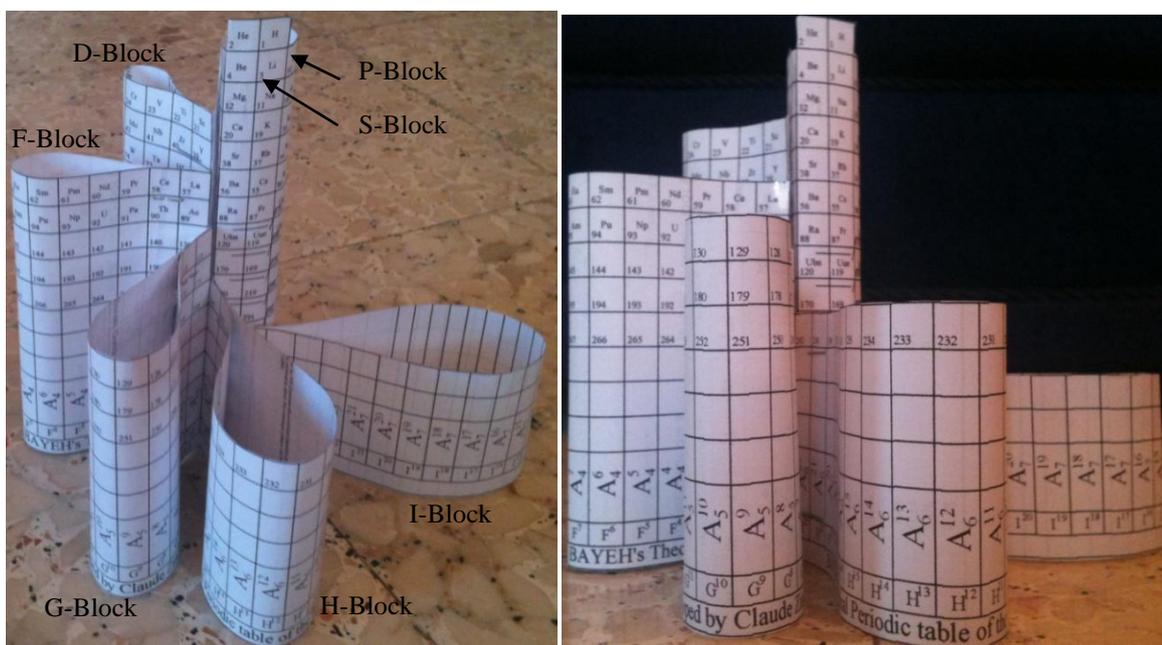


Figure 5: Bayeh's theoretical periodic table in 3D version.

8. Conclusion

In this paper, the new periodic table is presented and discussed. New and original methods and formulae are used in order to arrange the atomic elements in an extremely organized manner and sequence blocks. There are many advantages of the new periodic table that are discussed in this paper. The new theoretical periodic table is designed and shaped in 3D model. The comparison between the old and new table give a “credit to the new one”.

References:

- [1] Andrews, D.H. et Kokes, R.J., “Notions fondamentales de chimie”, *DUNOD Paris*, pp. 1-120 (1968).
- [2] Adrian Dingle, Simon Basher, “The Periodic Table: Elements with Style”, *Kingfisher*, ISBN 0753460858, pp.1-128 (2007)
- [3] Eric R. Scerri, “The Periodic Table: Its Story and Its Significance”, *Oxford University Press, USA; 1st edition*, ISBN-10: 0195305736, ISBN-13: 978-0195305739 (September 15, 2006)
- [4] Henry, Eyring, “Quantum Chemistry”, *the late John Walter and George E. Kimball John Wiley and Sons*; ISBN:0-471-24981-5, pp. 1-50, (2006)
- [5] Kunming Xu, “The unification of Pythagorean Theorem for electronic orbitals with Kepler's law for planetary orbits”, *Scientific Research Monthly*, pp.1-17. (2006)
- [6] Primo Levi, “The Periodic Table”, *Schocken; Translated By Raymond Rosenthal*, ISBN-10: 0805210415, ISBN-13: 978-0805210415, pp. 1-240 edition (April 4, 1995)
- [7] Meta-synthesis website http://www.meta-synthesis.com/webbook/35_pt/pt_database.php
- [8] Meta-synthesis website http://www.meta-synthesis.com/webbook/35_pt/pt_database.php?Button=All