BAYEH's Theoretical periodic table of Elements

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Abstract: 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 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.

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1. Introduction

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 additional 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 and emphasis the relation between blocks and atomic numbers in a 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. 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.

2.1 Bayeh's theory behind the periodic table

The main target 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. In another 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

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

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

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

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

$$Z = 2 + 2\sum_{2}^{N} i^2 p \quad (3)$$

•The number of the electron in the outer shell (peripheral electrons) = $Z-(2+2\sum_{2}^{N-1} i^2 p)$ (4)

The 3 formulae 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.

•Let's take an example:
Consider the following atom with Z=365 (Thp)

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

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

⇒i=7 and p=1 then the period is even➔ $n = 2(i-1) = 2(N-1)$ ⇒ 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:

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

$A_7^1 \begin{cases} number\ of\ electron\ in\ the\ orbital\ A7 \\ Orbital\ A7 \end{cases}$

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

2.2 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.: $A_1 = S; A_2 = P;\ A_3 = D;\ A_4 = F$ ... 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 S2) group according to its orbital properties that is similar to all elements in the same column or group.

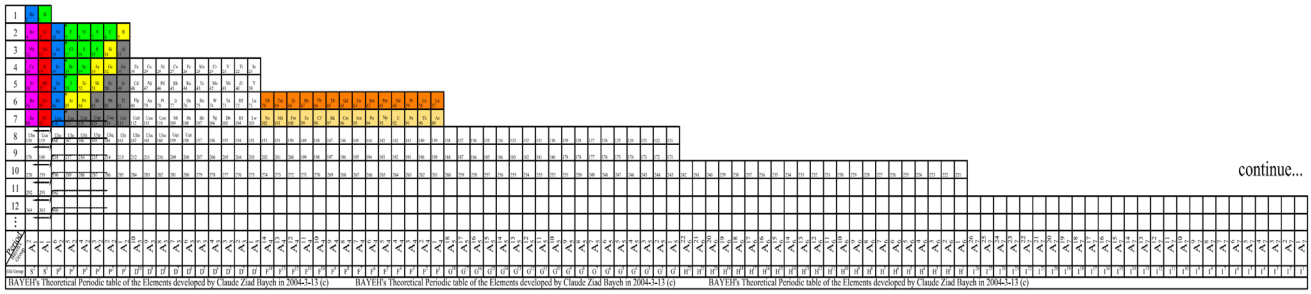


Figure 2.1 : Extract part from the Bayeh's periodic table.

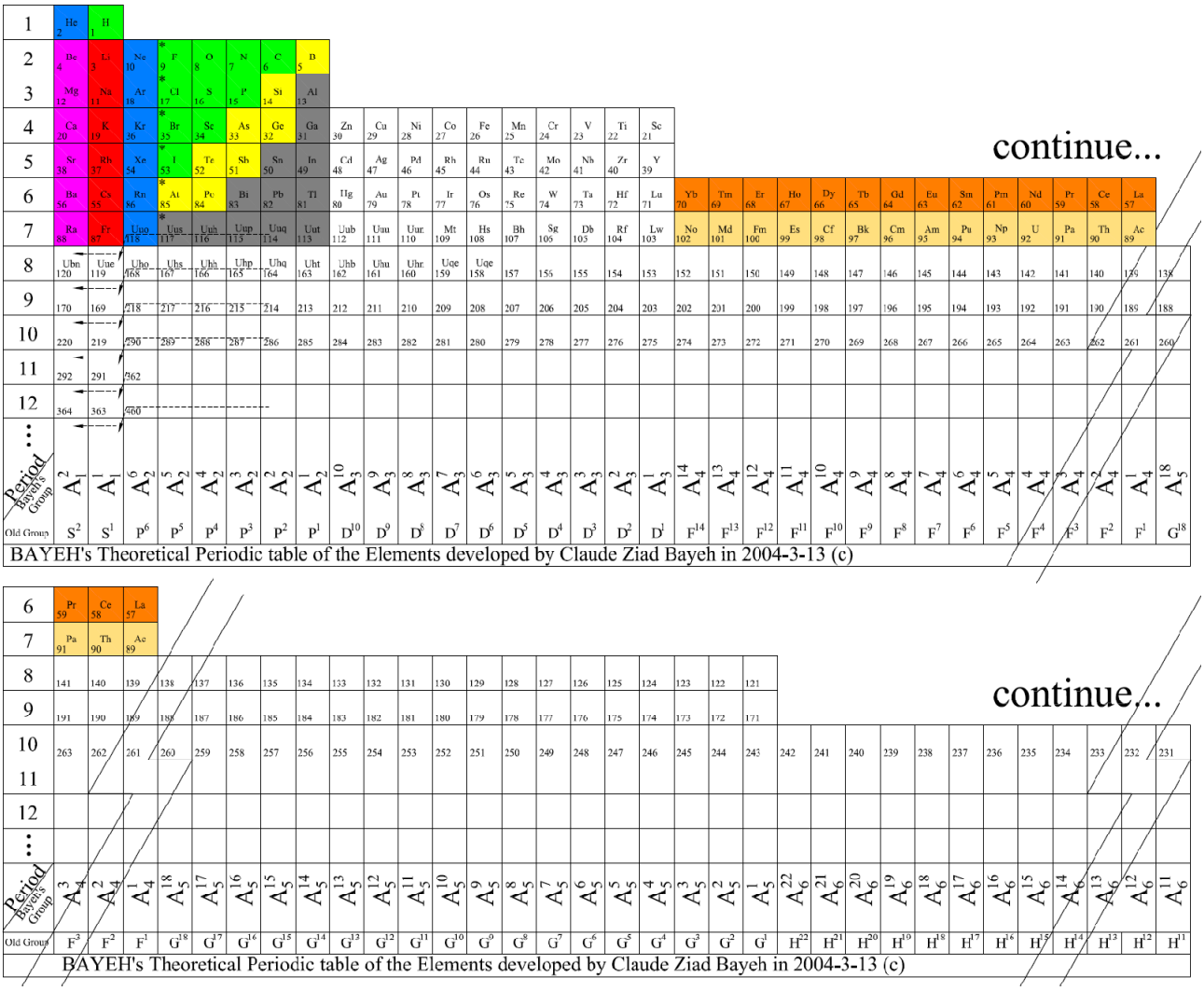


Figure 2.2 : More close from the Bayeh's periodic table presenting first elements

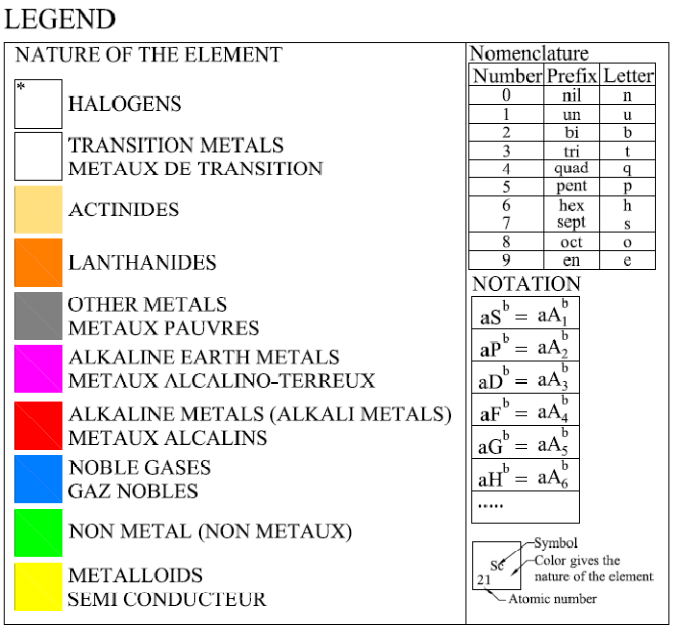


Figure 2.3 : Legend of the periodic table

3. 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.

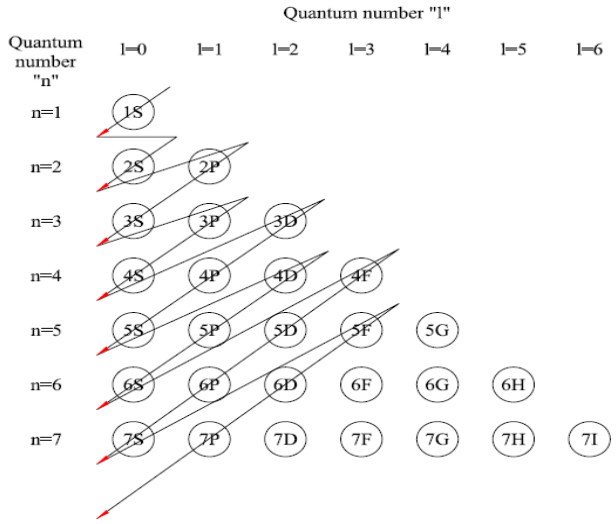


Figure 3: periodic table is constructed by listing the elements by ***n*** and ***l*** quantum number

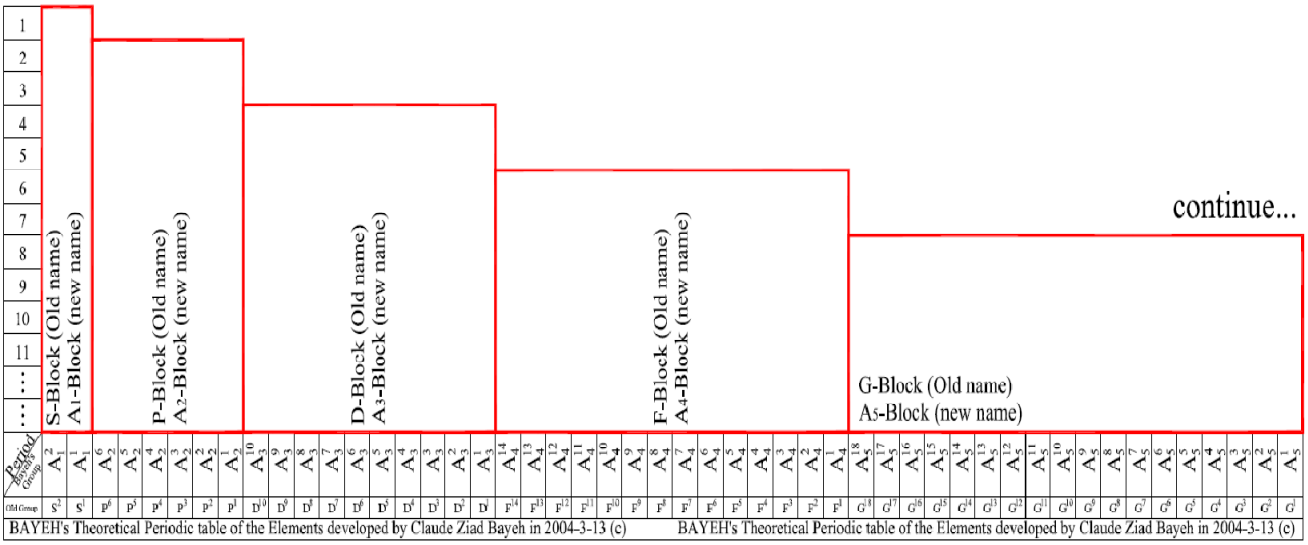


Figure 3.1: Theoretical periodic table arranged by sequence Blocks with respective Groups number.

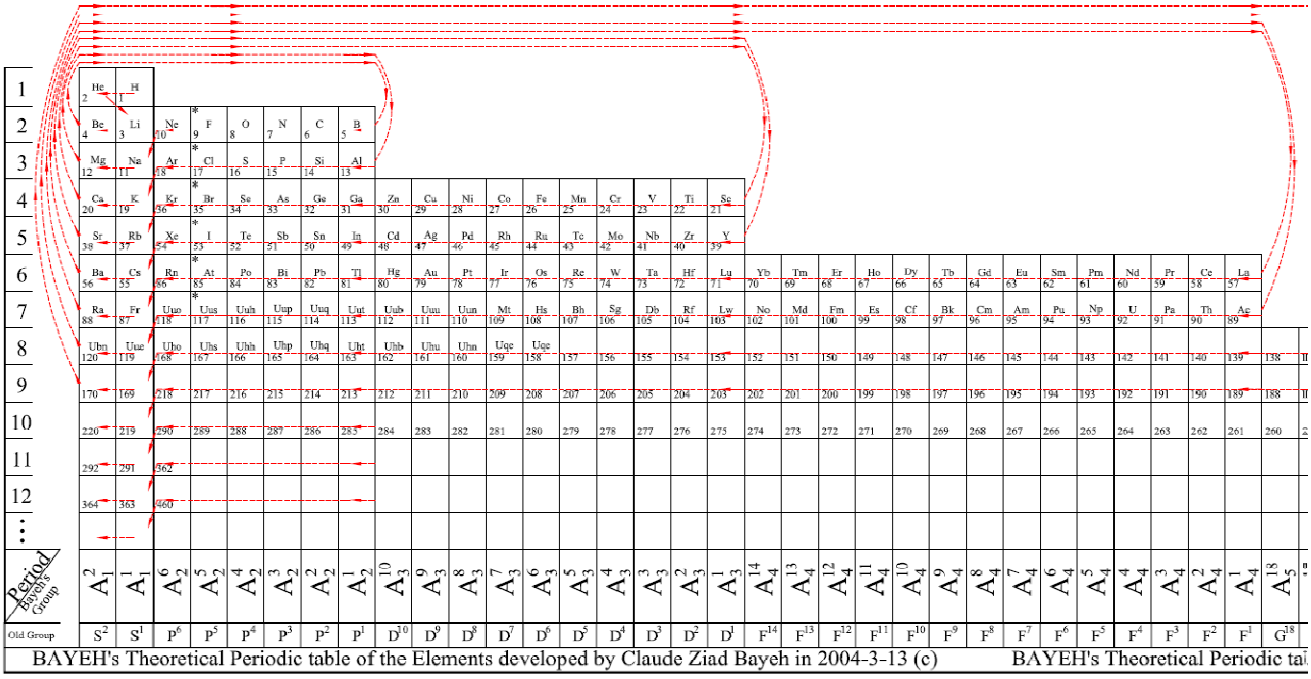


Figure 3.2: Theoretical periodic table arranged by sequence atomic number.

4. Disadvantage of other existing periodic table

-The old periodic tables are not based on theoretical methods of quantum theory.

-The problem with the mapping is that the generated sequence is not continuous with respect to atomic number, for example: Check out the sequence Ar to K, 18 to 19. (Refer to “figure 4.1”)

-The compression used introduces the well known problem known as a "fence post error". The effect is that:

La and Ac: move from f-block to d-block, Lu and Lr: move from p-block to f-block (Refer to “figure 4.2”)

-Most of periodic tables are not based on theoretical methods of quantum theory, therefore many element are not placed in the correct place in the table according to the quantum theory.

-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.

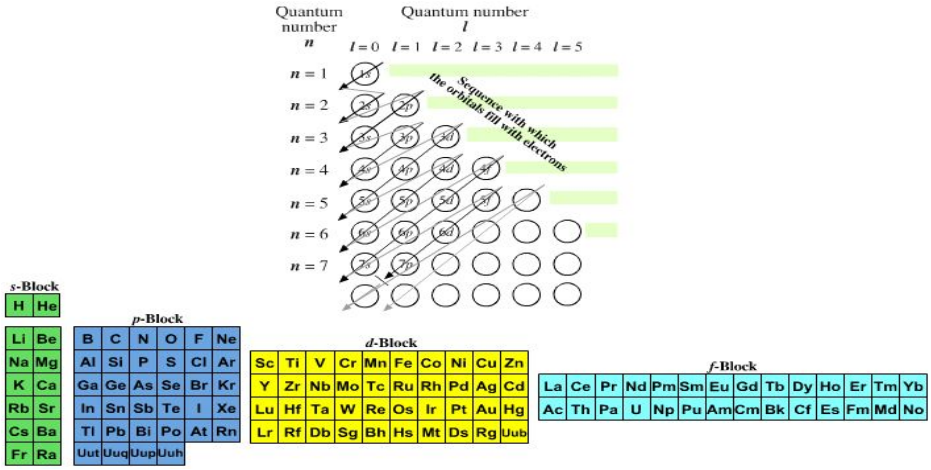


Figure 4.1: modern periodic table arranged by sequence Blocks.

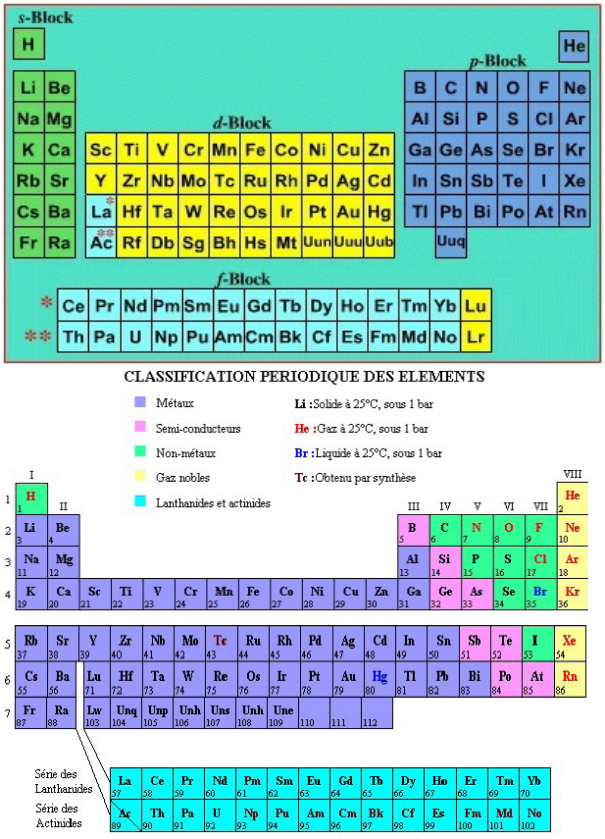


Figure 4.2: Mendeleïev version for periodic table with common error.

5. Bayeh's theoretical periodic table in 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")

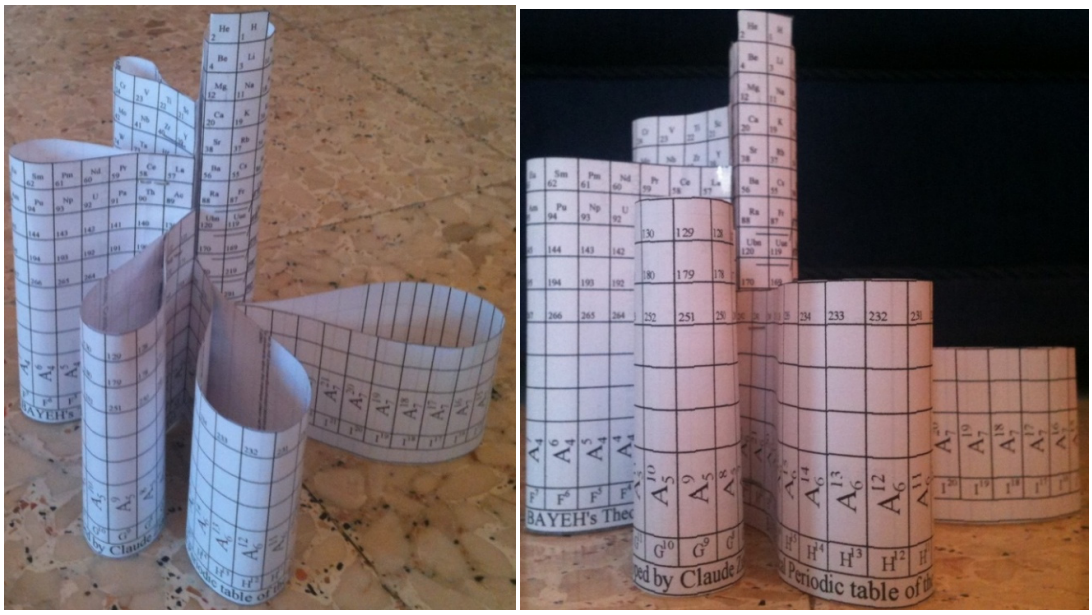


Figure 5: Bayeh's theoretical periodic table in 3D version

6. Sample of Existing 3D periodic table

These periodic tables are made by Roy Alexander. These are based on the old and standard periodic table which the disadvantages are discussed in the section 4.

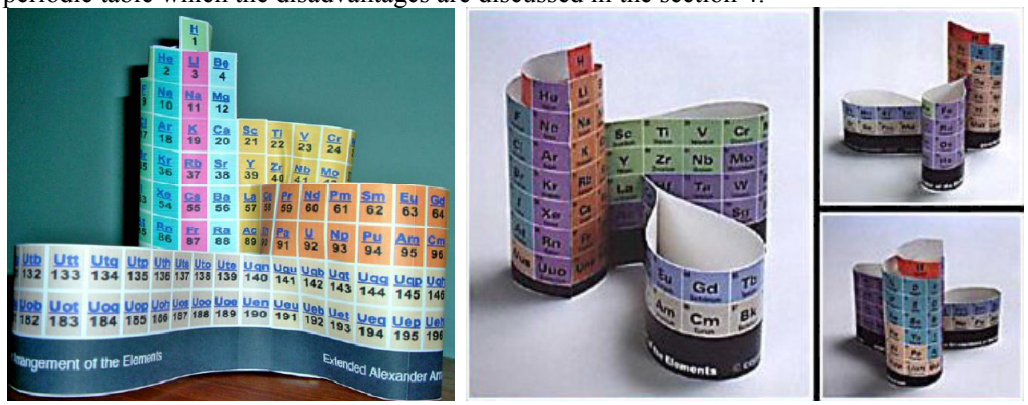


Figure 6: 3D periodic table by Roy Alexander

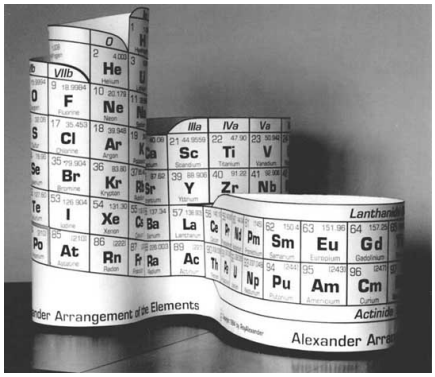
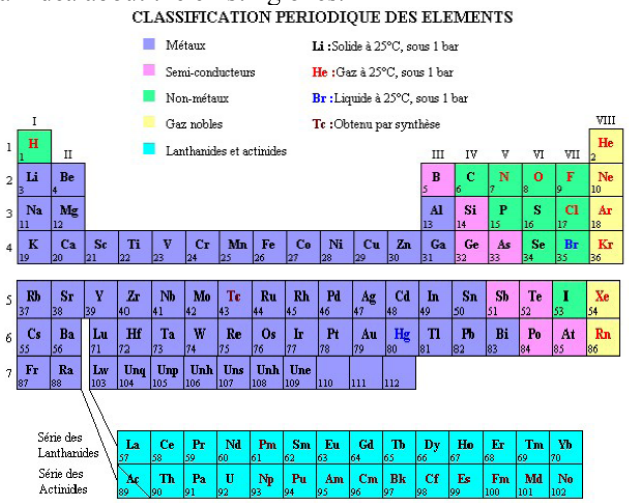
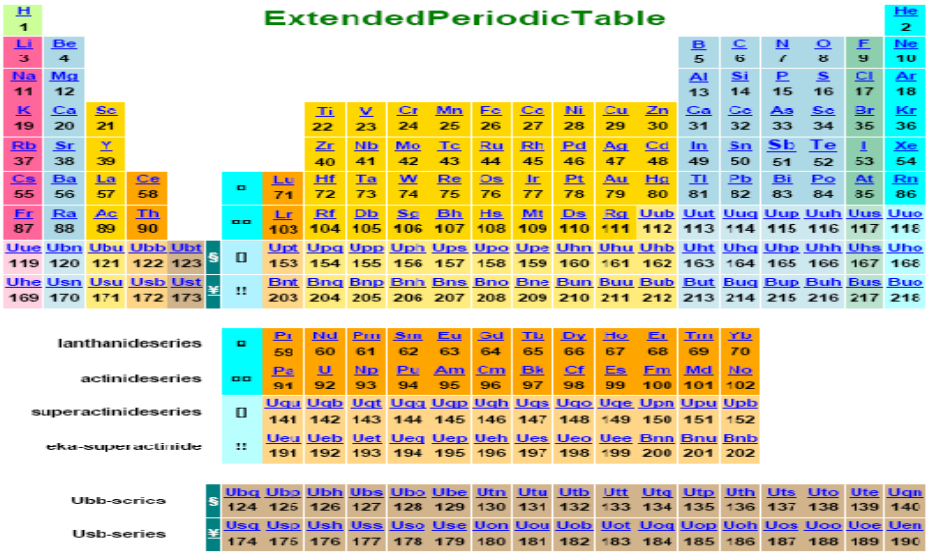


Figure 6.1: 3D periodic table by Roy Alexander

7. Sample of existing periodic tables

Till now many scientists and researchers have developed a huge number of periodic tables with different sizes and shapes, in this section some important periodic tables are shown in order to give an idea about the existing ones.





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)

Internet sites:

[1] http://www.chemicool.com/

[2] http://www.meta-synthesis.com/webbook/35_pt/pt_database.php

[3] http://www.periodicspiral.com/