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The Gastropod Shell Structure as a Blueprint for a Periodic System: A New Theory for Element Configurations

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Abstract

The purpose of this article is to propose a new design for the periodic table of elements. The new design is based on a three-dimensional (3D) model of the gastropod shell structure and presents a mechanism of the formation of elements that reflects the laws of nature that guide the formation of the gastropod shell, electron orbitals, and element structure. The author also identifies challenges associated with the current standard periodic table, such as the positions of hydrogen, helium, lanthanides, and actinides. The author's research is a response to the IUPAC's request, dating back to 2016, to settle unresolved disputes surrounding the current standard periodic table. Hence, the author proposes the "Gastropod Shell Model", which presents the periodic system in 2D and 3D snail shells based on a hypothesized unifying principle guiding the formation of elements: the universal unified theory that considers the spiral and vortex forms as the bridge between energy and matter. The author was able to position hydrogen, helium, lanthanides, and actinides uniquely in their proposed periodic system to solve problems associated with their positions in the standard periodic table. Readers will be interested in uncovering the "hypothesized unifying principle guiding the formation of elements".

Keywords

3D Periodic Table, Gastropod Shell, Spiral Model

1. Introduction

The periodic table of elements is one of the most important developments of modern science.

It not only unifies a wide range of chemical and physical phenomena, but also significantly contributes to the development of atomic physics and eventually to the theory of quantum mechanics.

However, the periodic table remains an active area of research for physicists and chemists, and there are always debates about how best to present the periodic table, even though it already existed for nearly 153 years.

The classical periodic table is based on the elements that Mendeleev knew when he developed the table in 1869.

However, Mendeleev was neither the first nor the last person who explained periodicity. Only a few years earlier, a French geologist Alexandre-Émile Béguyer de Chancourtois had published his interpretation: a complicated model in which the elements were arranged along a spiral line wrapped around a cylinder. Also in the 1860s, an English pharmacist John Newlands first arranged the elements by atomic weight, a strategy that Mendeleev and others followed until the early 1900s when the discovery of atomic numbers provided a more accurate measure.

The current structure of the periodic table was created in 1945 after Glenn Seaborg, the winner of the Nobel Prize in Chemistry.

The modern interpretation of the periodic table came about after the development of the physical model of the atom as a positively charged nucleus surrounded by negatively charged electrons. The atoms of various elements differ in the charge (number of protons) of their nuclei. This hypothesis, which was experimentally proven, explained the formal numbers for the periodic table elements as the set of natural physical invariants for atoms.

The standard periodic table of elements has since evolved into a two-dimensional table of chemical elements arranged by atomic number, typically in 18 columns named by the International Union of Pure and Applied Chemistry (IUPAC) and seven rows representing different numbers of electrons that can be held by the inner shells, reflecting different lengths of the periods observed in the periodic table.

The periodic table presents a scheme of patterns and a law of periodicity that contributed to a better understanding of the relationships among elements. It provides a concise way to understand how all known chemical elements react with each other and form chemical bonds, helps explain the properties that make them react in this way, aids in the development of new classes of compounds, and aids in the search for and discovery of new elements.

Theoretical physics has provided a partial explanation of the shape and existence of the Mendeleev table and its modern versions. Moreover, there seems to be no exact periodicity because the period has no constant value in the standard periodic system.

Generations of scientists have made many attempts to express this non-exact periodicity in various graphical forms of the periodic table: 2D, spiral, helical, or 3D, and more than a thousand alternative periodic tables have often been developed to highlight or emphasize various chemical or physical properties of elements that are not so obvious in traditional periodic tables.

The fact that many versions suggest some doubts as to whether the current standard periodic table is the best possible configuration should be considered.

Moreover, despite the dramatic changes in science, such as the development of relativity and quantum mechanics, there has been no revolution in the fundamental nature of the periodic table and there is no fundamental model or theory that supports the standard periodic table or proposed alternative periodic tables. The electron energy is quantized based on the principle that electrons occupy a series of energy levels or orbits, each level having a distinct and discrete energy value. However, a simple quantum mechanical theory does not account for the repetition of all period lengths, except the first.

Therefore, deriving precise, generally applicable laws about chemical elements from the current periodic table or quantum mechanics is difficult.

Furthermore, the standard arrangement of the periodic table suffers from various anomalies; hence, it has recently been questioned by philosophers of science. Some of them believe that there is a better way to arrange the elements in column groups.

In the classical periodic table, many jumps from the left to the right side of the table. In the first three rows and from elements 56 to 88, we have to jump down to the lower two rows.

Oddly enough, the first two elements, hydrogen, and helium represent something of an anomaly, and there has always been disagreement about the exact group they should be assigned. In the conventional modern periodic table, the so-called medium-length form, which consisted of elements that belong to Groups 1 and 18, respectively, are alkali metals and noble gases.

They argue that there is a correct solution to the disputes over the placement of certain problematic elements with low atomic numbers, namely, hydrogen and helium, and at high atomic number end of the periodic table, such as lanthanides and actinides, which is still an open question.

In the case of hydrogen and helium, there has always been disagreement about the exact group to which they should be assigned. In the conventional modern periodic table, the so-called medium-length form, which consisted of elements that belong to Groups 1 and 18, respectively, are alkali metals and noble gases.

Hydrogen can lose an electron and then gain one. Therefore, it can be placed either in Group 1 as usual or Group 17 along with halogens. Recently, a new version of the left-handed table has been proposed that places hydrogen at the top of halogens to avoid the heresy of placing helium among the alkaline earth. It has even been proposed to place hydrogen at the top of the carbon group, since its atom, like carbon, has a half-filled outer shell. There is no proposal for a periodic table that ideally solves these grouping problems.

Even helium, element 2, is not so easily assigned. An alternate version of the periodic table ranks helium with beryllium and magnesium, instead of its noble gas neighbors, based on the arrangement of all electrons and not just the outermost ones.

The left-tiered table proposed by Charles Janet in 1920 shows the elements in a continuous order without gaps or interruptions, with the element helium removed from the group of noble gases and moved to alkaline earth, such as beryllium, magnesium, and calcium.

This form has experienced a revival, as it seems to show the order of orbital occupation more clearly than the conventional form [1].

However, helium was surprisingly placed among alkaline earth metals. This shift can be justified by the outer electron structure of helium, which, like the other members of the alkaline earth group, has two such electrons. However, from a chemical point of view, helium, like noble gases, is the least reactive of all elements in the periodic table.

Hydrogen atoms have a single proton at their center and a single electron at the lowest energy level, whereas helium atoms have two protons and two electrons at the lowest energy level, which is filled with the maximum number of electrons.

Thus, the question of where to put hydrogen and helium remains open and unresolved.

Another problem is related to Group 3 [2] [3] [4] [5].

Another problem is the position of the lanthanide and actinide groups. In element 57, lanthanum is considered part of the f-block. To account for this, in most periodic tables, elements that make up this f-block are separated and placed under the table, creating a gap in Group 3.

Therefore, the rare metal is currently in a separate block at the very bottom of the periodic table.

Moreover, identifying which of the f-block elements should be the first remains controversial. Some chemists believe that the decision should depend on electron configuration, which would leave the table as it is, with lanthanum and actinium at the left end of the f-block. Others point out that lutetium and lawrencium are currently at the right end because of their chemical properties, such as the atomic radius and melting point. The periodic table in the long form, with 32 columns in which the sixth and seventh periods of the lanthanide and actinide series are inserted, breaks the continuity of elements present in other periods. Relativistic calculations show that the outermost electron of lawrencium goes into a 7p orbital rather than a 6d orbital. Recent experiments with this very short-lived element seem to confirm this placement and suggest that it has a surprisingly low first ionization potential [6].

Therefore, some chemists have argued that lutetium and lawrencium, rather than lanthanum and actinium, should be assigned to the d-block as heavier analogs of scandium and yttrium, whereas lanthanum and actinium should be considered the first members of the f-block with irregular configurations [7].

All these problems have convinced some chemists that the standard periodic table should be redesigned. Mark Leach of Manchester Metropolitan College, UK, maintains an Internet database of periodic tables [8] that contains hundreds of versions.

In 2016, the IUPAC established a working group to settle the still-unresolved dispute.

The elements are divided into seven groups according to their main energy level. Each group is characterized by the maximum possible number of levels occupied by electrons.

However, no theory described the reasons for this behavior. We hypothesize that there is a unifying principle that guides the formation of elements and determines their structural conformation.

In this study, we propose a unifying model to explain the logic behind the periodic table and elemental configuration. This model is called the gastropod shell vortex model because it is the same model behind the formation forces that guide the gastropod shell in its formation. Further, we will show that all elements were guided by a common formation mechanism, the snail shell vortex.

In this way, a new model of the periodic system will be presented in the 3D snail shell model based on a unifying principle that guides the formation of elements; determines their chemical properties, electron configuration, radius, etc.; and solves problems and anomalies in the current standard periodic table.

2. Gastropod Shell Structure

The vortex structure is a general blueprint that determines the formation and structure of matter.

Herein, a unifying spiral model is proposed based on a spiral model that resembles the gastropod shell. This model is not randomly selected but is guided by a universal unified theory that considers the spiral and vortex forms as the bridge between energy and matter. The basic structures of elementary particles have a vortex shape.

A new theory that describes the origin of the fine structure constant is presented, based on the structures of the electron and the hydrogen atom. Both are considered as irrotational superfluid vortices with a permanent flow pattern and differential rotational velocity at the core of the vortex relative to its boundaries.

The previous article [9] described the nature and the origin of Constant G based on superfluid vortex theory.

This concept has been discussed in several previous articles describing the electron as a non-rotating superfluid vortex with a permanent flow pattern and a different rotational velocity in the vortex core compared to its edges. This vortex model provides a mathematical model for calculating the mass, kinetic energy, density, volume, time, charge, and particle-wave duality. Such mathematical formulations have been presented to confirm the theory [10] [11].

Furthermore, the vortex form of the electron made it possible to resolve the puzzling wave-particle dualism [12].

Moreover, the fine structure constant was found to be directly related to the vortex shape of the electron and hydrogen nucleus [13].

The same model was presented to explain the origin of the gravitational force [14] and the gravitational constant G [9], indicating the universality of the phenomena.

Therefore, this study provides a natural continuity to describe the matter of different complexity levels with the same basic vortex model.

The vortex structure guides the formation of elements and is the blueprint of their formation, thereby using the blueprint for the structure of the new periodic table.

We begin by describing the structure of the snail shell to familiarize ourselves with the model and then apply it to the periodic system.

The snail consists of a shell into which the animal can generally retreat.

Then, >90% of snail species have dextral (right-handed) shells and a small minority are sinistral (left-handed) [15] (**Figure 1**).

The gastropod shell used in our study is dextral.

The main gastropod shell of the snail consists of seven whorls, the apex, the columella, the mouth or opening, the lip, and four or more spikes (**Figure 2**).

Each whorl can have 0, 1, or 2 revolutions. Each revolution turns 360˚ known as the period. With each revolution, the generation curve remains constant throughout its growth.

Each level has the shape of a sinuous snail shell with an apex and a depressed umbilicus in the base and an aperture (**Figure 3**).

The spiral shell structure may contain one, two, or four turns in each plane (**Figure 4**).

The main body consists of seven superimposed snail shells, with the apex of each level merging with the umbilicus of the next level (**Figure 5**).

The snail shell of the first level has no revolution with only two vortices, one at the aperture and the second at its apex (**Figure 6**).

The second and third whorls each have one revolution, labeled A; the fourth and fifth each have two revolutions, labeled A and B; the sixth level has four

Figure 1. Shells of two different species of marine snails: on the left, the normally sinistral (left-handed) shell, and on the right, the normally dextral (right-handed) shell.

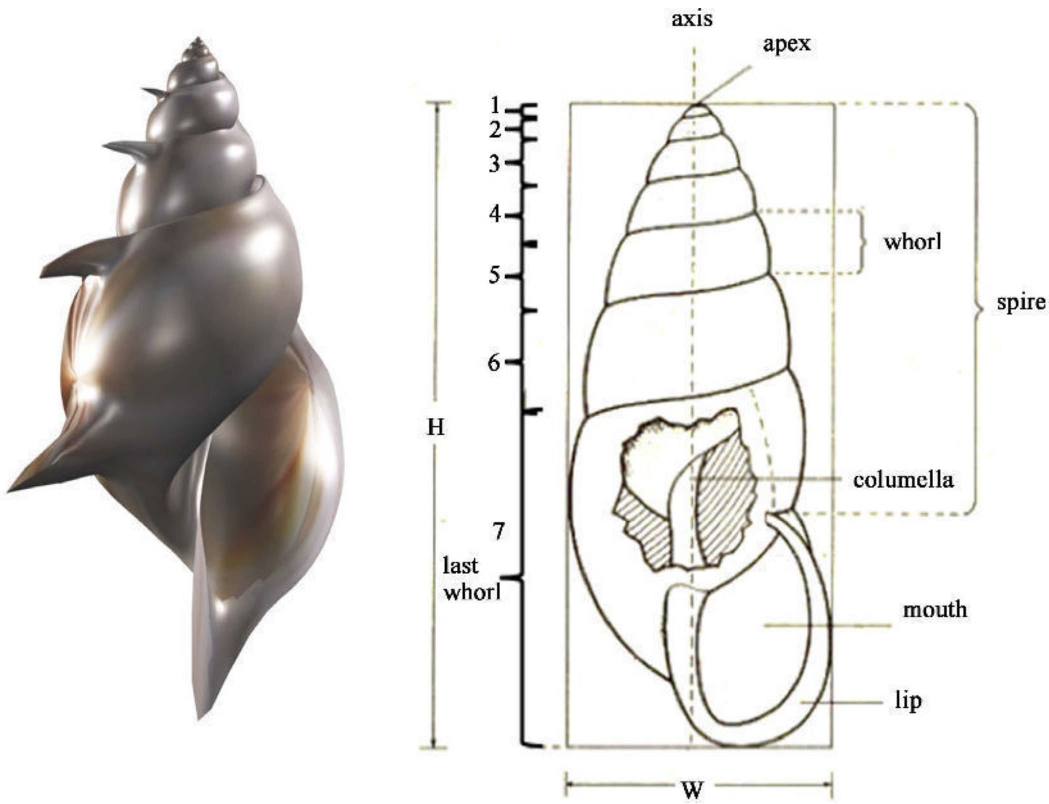

Figure 2. Right: Outer structure of the snail shell. Left: Inner and outer parts of the snail shell.

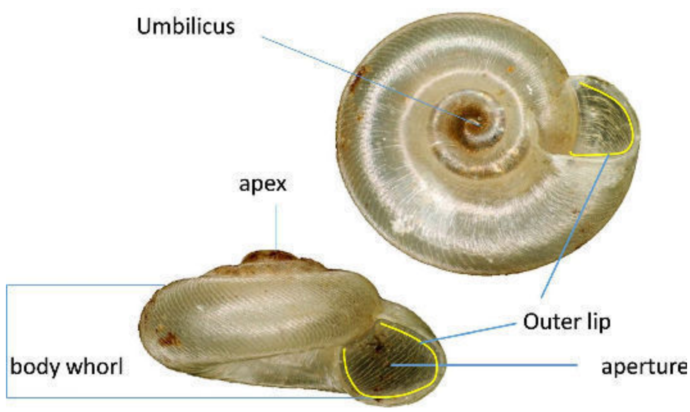

Figure 3. The snail shell structure.

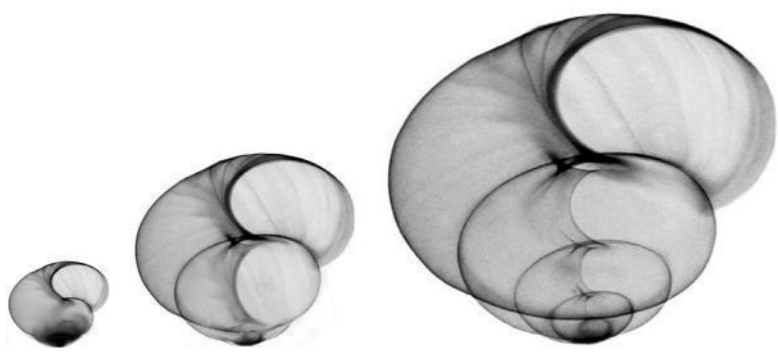

Figure 4. Snail shells from the left to right zero with one and four turns (periods).

Figure 5. The structure of the main shell, which consists of seven snail shells, with the shell base aligned with the apex of the main shell and the apex of the snail shell aligned with the base of the main shell.

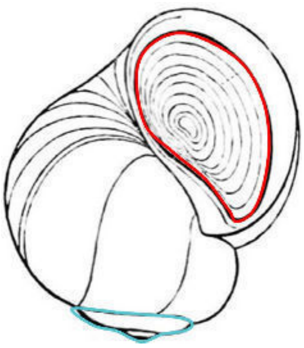

Figure 6. Closed snail with the spiral aperture.

revolutions A, B, and two Cs; and the seventh has A, B, and two Periods D.

The diameter of the turns in the single level decreases from the shell opening in that plane to the apex. In each new level, the diameter of the snail shell from the apex of the snail to the base is larger than that in the previous plane, increasing the diameter from one level to another but decreasing within the same level.

A continuity between A periods in different levels forming one spiral line is established, starting from Level 2 to Level 7. Similar to Period B, there is continuity between Period B of different levels, starting from Level 4 to Level 7 (Figure 7).

In all levels with Periods A and B, a continuity between two Periods A and B is established (Figure 8).

The apical view allows viewing the spiral model that distinguishes between Periods A and B by different colors (Figure 9).

In the gastropod shell, the sixth and seventh levels are connected to the shell aperture with two lips C and D; the inner lip C is connected to Level 6 and the outer lip D is connected to Level 7.

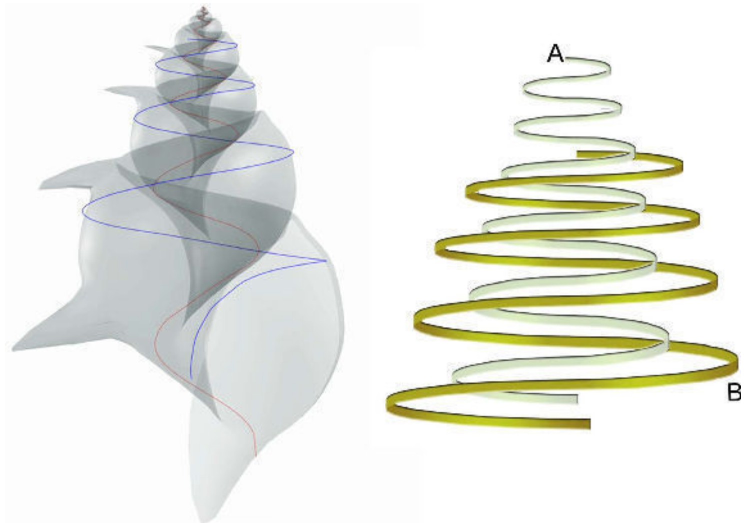

Figure 7. Left: The spatial relationship between Periods A and B. Right: Periods A (clear line) and B (dark line) as the continuation of two spirals: (A) and (B).

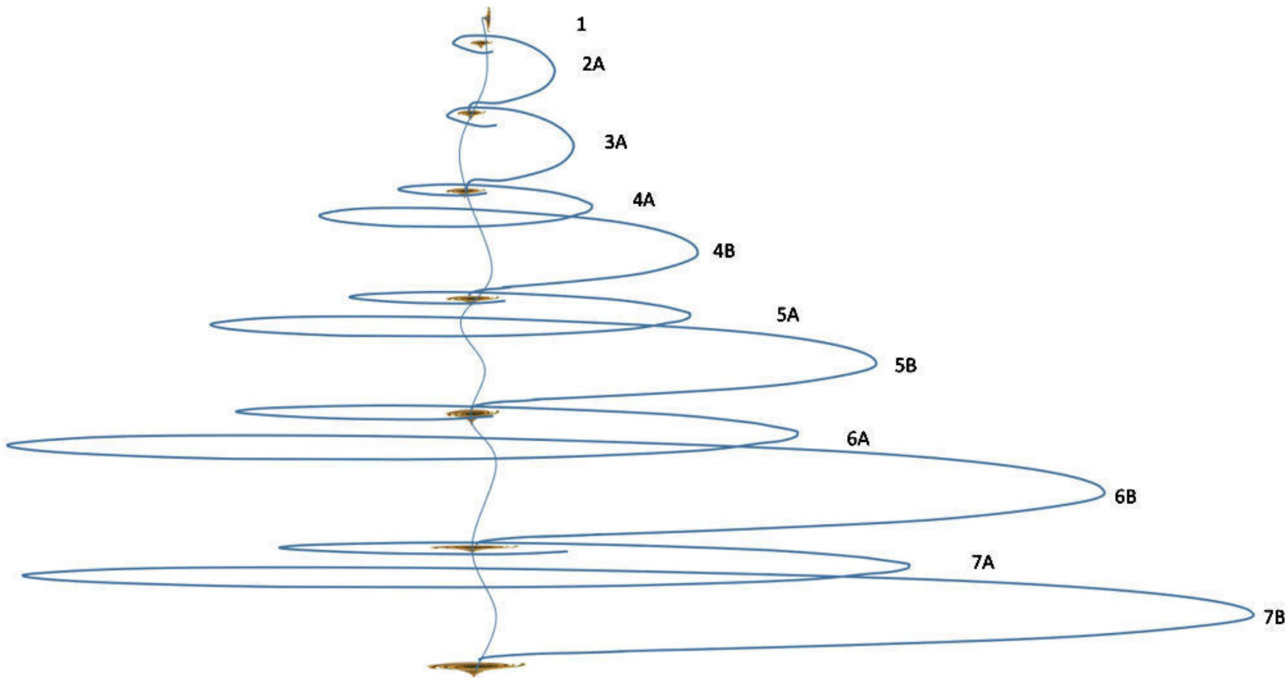

Figure 8. The gastropod shell model shows that each level contains a vortex on the columella, regardless of how many periods each level contains.

The outer lip cylinder D has a smaller radius than the inner C; however, the radius decreases from the right to the left in both. In each lip, 14 small spikes were observed (Figure 10).

The inner lip is labeled Period C, and the outer lip with Period D. These two periods have a spatial orientation normal to Groups A and B (Figure 11).

The connection between the seven snail shells in the central axis of the main shell forms the columella, which runs from the apex of the shell to the middle of the underside of the shell or the upper end of the siphonal canal (Figure 12).

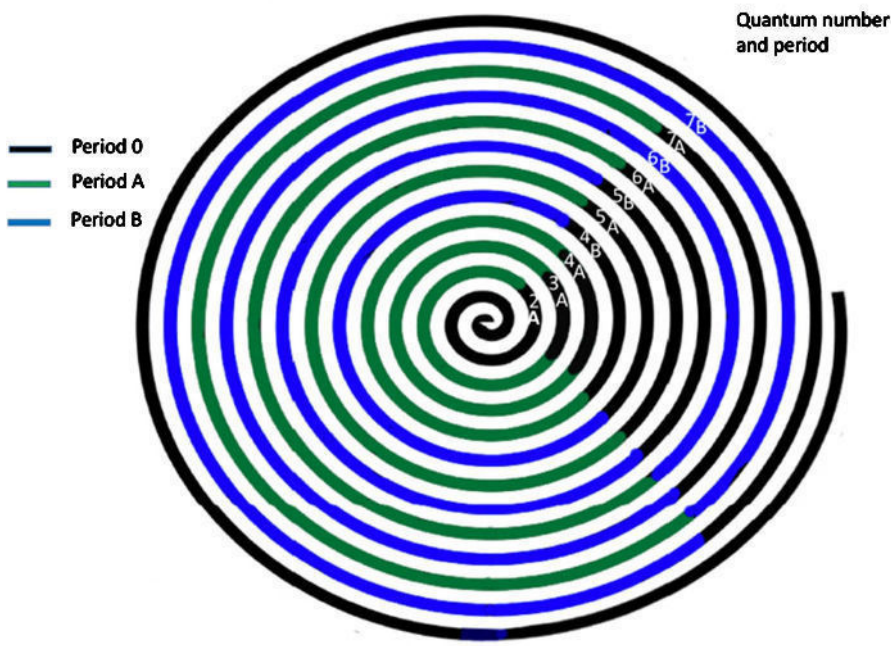

Figure 9. The spiral model in which Periods A are drawn in green lines and Periods B in blue lines.

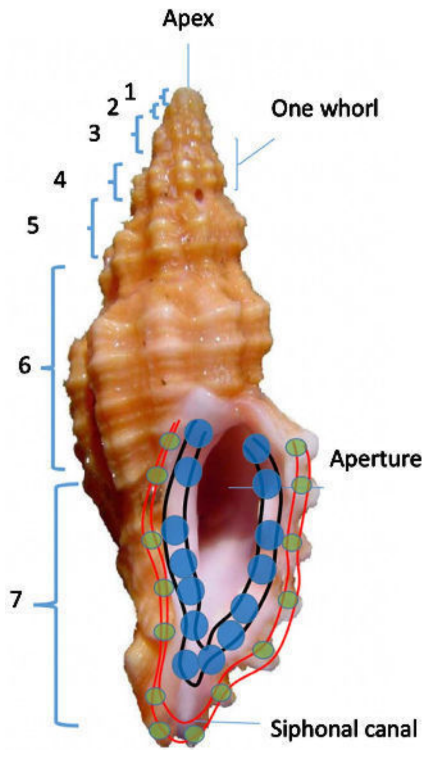

Figure 10. The two lips of the gastropod shell opening. In each lip, 14 protruding small spikes were marked with blue and green circles.

Furthermore, in the gastropod shell model, four protruding spikes are connected to Periods 4A, 5A, 6A, and 7A. The diameter of their spikes decreases from the base of the spike to the apex (**Figure 13**).

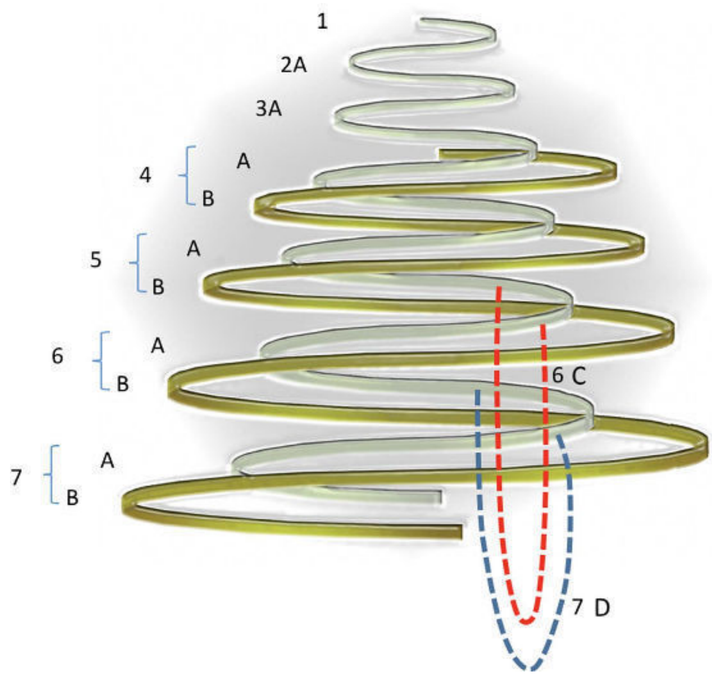

Figure 11. The vortex tubes with gray light color stand for Periods A, the dark green color for Periods B, the red color for Period C, and the blue color for Period D.

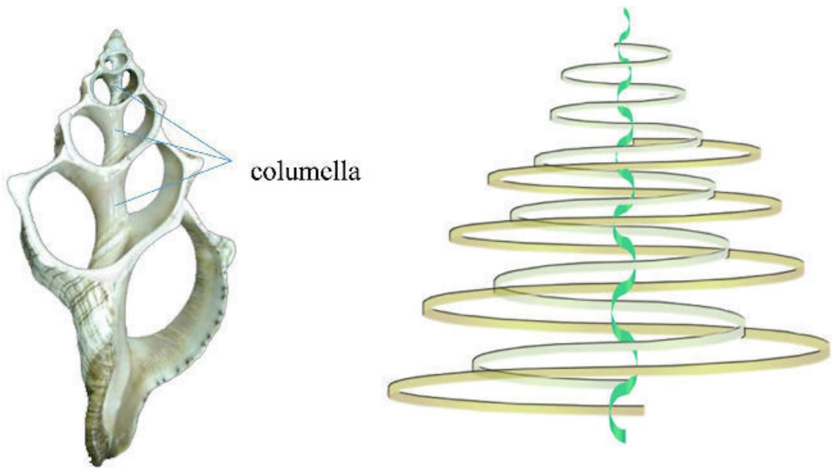

Figure 12. The left side of the columella is the axial backbone of the gastropod shell and forms a central spiral line. The right side of the culomella is represented by the central green line.

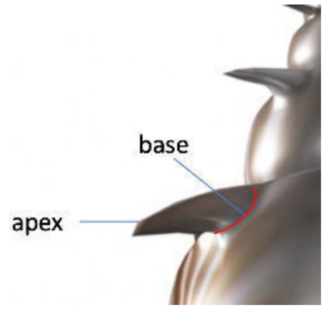

Figure 13. The diameter of the spikes decreases from the base to the apex.

3. Element Configuration

The arrangement of elements has a very concise orientation determined by the general shape of the gastropod shell model. The chemical and physical properties are determined based on the position of elements in the 3D model.

In the gastropod model, the main shell is divided into seven levels, each level can have zero, one, two, or four periods. We define a period as a 360˚ spiral tube, each containing seven elements numbered with Roman numerals from I to VII.

All elements that are at the same level have the same principal quantum number, *i.e.* the number of orbital shells surrounding the nucleus.

In the first level, no period is assigned and contains only the two elements hydrogen and helium. In the second and third levels, a period comprising seven elements is assigned, *i.e.* Period A. In the fourth and fifth levels, there are two periods with seven elements each, Periods A and B, respectively. Furthermore, in the sixth and seventh levels, two more periods are assigned with fourteen elements each, Period C in Level 6 and D in Level 7. The fact that each of these two periods has 14 elements is considered two periods. Therefore, the sixth and seventh levels each have four periods.

The four spikes associated with Period A in Levels 4 to 7 have three numbered VIII IX and X each.

The nucleus orbital shell is patterned to the shape of a snail shell arranged vertically in the vortex tube of the period, with the tip aligned with the center of the main snail (**Figure 14**).

The elements in Period B are numbered from 1 to 7 as in Period A. When Period A is followed by Period B, the elements are again numbered from 1 to 7. The hydrogen is connected to the columella where helium is located, and at the end of Period A in Levels 2 and 3, which are connected to the noble gas located in

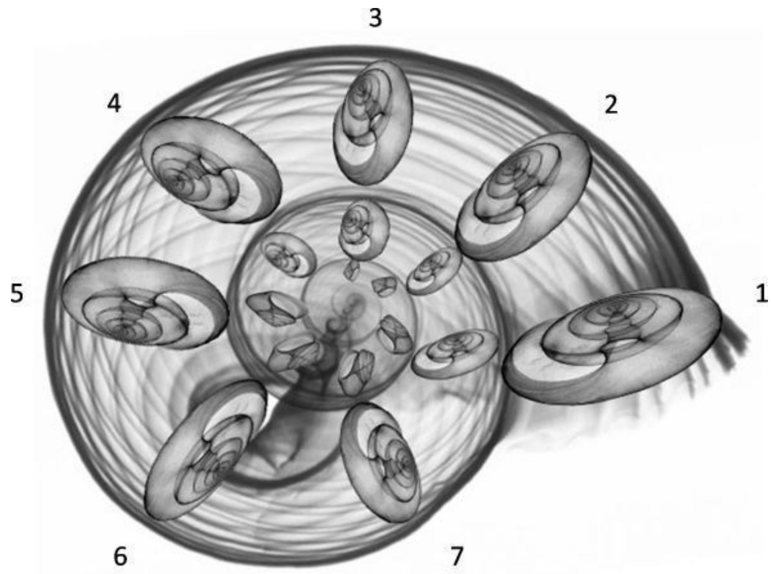

Figure 14. Seven elements within each period, the diameter of the orbital shell of elements decreases with the increase of their atomic number.

the columella (Figure 15).

The elements in different levels that have the same number in Periods A and B form a column known as a group, numbered from I to VII with Roman numerals. Noble gases are designated by Group 0. The elements in the spikes are called Group S and numbered VIII, IX, and X. Thus, there are eleven vertical groups and seven horizontal levels.

Group zero

Group 0 is located at the center of each level along the columella, which contains 7 elements: helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), radon (Rn), and oganesson (Og) (Figure 16).

The apical view of noble gases looks like multiple vortices overlapping within the spiral center (Figure 17).

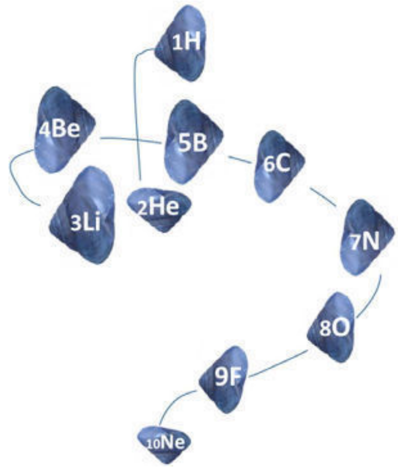

Figure 15. The spatial configuration of elements in Levels 1 and 2. If there are two periods, only the end of Period B is associated with the noble gas.

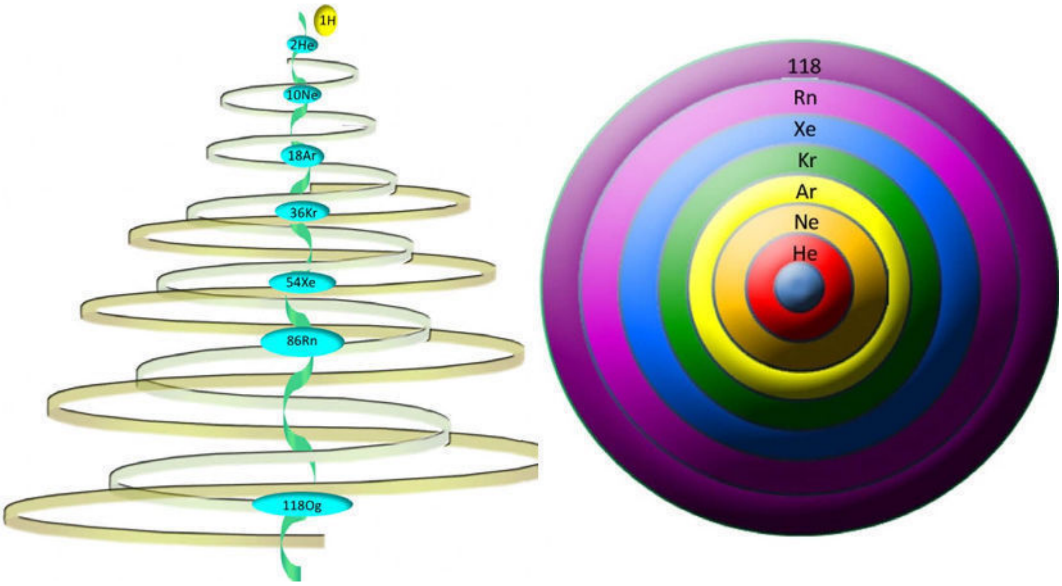

Figure 16. Lateral (right) and apical views (left) of the configuration of noble gases along the central helix of the columella.

4. Configuration of Elements in Period A

Period A is represented in all seven levels with seven elements each and arranged horizontally in seven groups from I to VII. All elements in Period A in different levels with the same number from the vertical column. The horizontal periods represent the quantum number and the vertical groups represent the atomic number. In each group, the atomic number increases vertically based on rules 2, 8, 8, 18, 18, and (Table 1).

Elements La, Lu, Ac, and Lr are attributed to Period C, but there are empty spaces in the table that match rules 18 and 32 with Period A elements. Therefore, we can assume that these four elements belong to Periods C and A.

This arrangement can be represented as a 3D helical shell or spiral model when viewed from the top of the shell to the base (Figure 18.)

The radius of each element in Group A is determined based on its position in

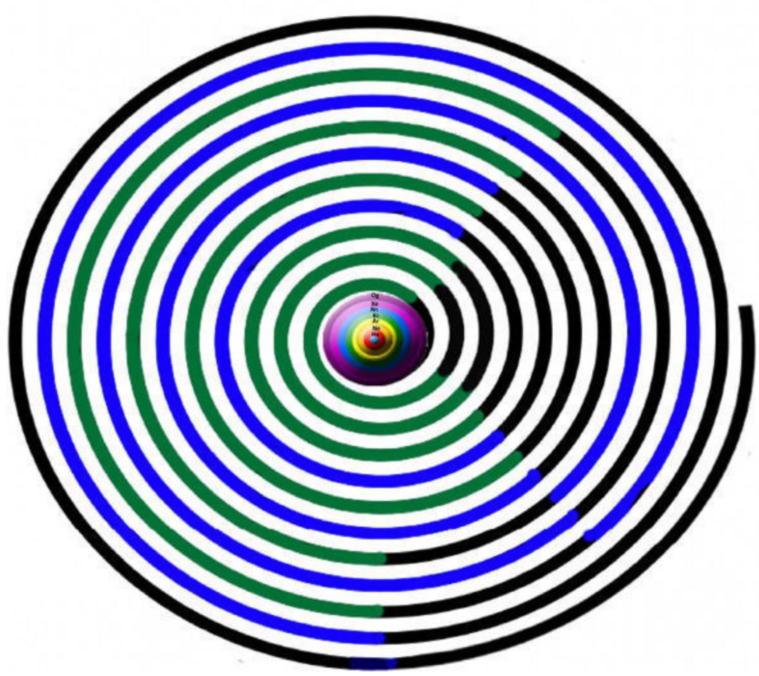

Figure 17. Noble gases at the center of the spiral shell along the central axis.

Table 1. Period A elements.

Level + period	Group	I	II	III	IV	V	VI	VII
2A		3 Li	4Be	5B	6C	7N	8O	9F
3A		11Na	12Mg	13Al	14 Si	15P	16S	17Cl
4A		19K	20Ca	21Sc	22 Ti	23V	24Cr	25Mn
5A		37Rb	38Sr	39Y	40Zr	41Nb	42Mo	43Tc
6A		55Cs	56Ba	57La 71Lu	72Hf	73Ta	74W	75Re
7A		87Fr	88Ra	89Ac 103Lr	104Rf	105Db	106Sg	107Bh

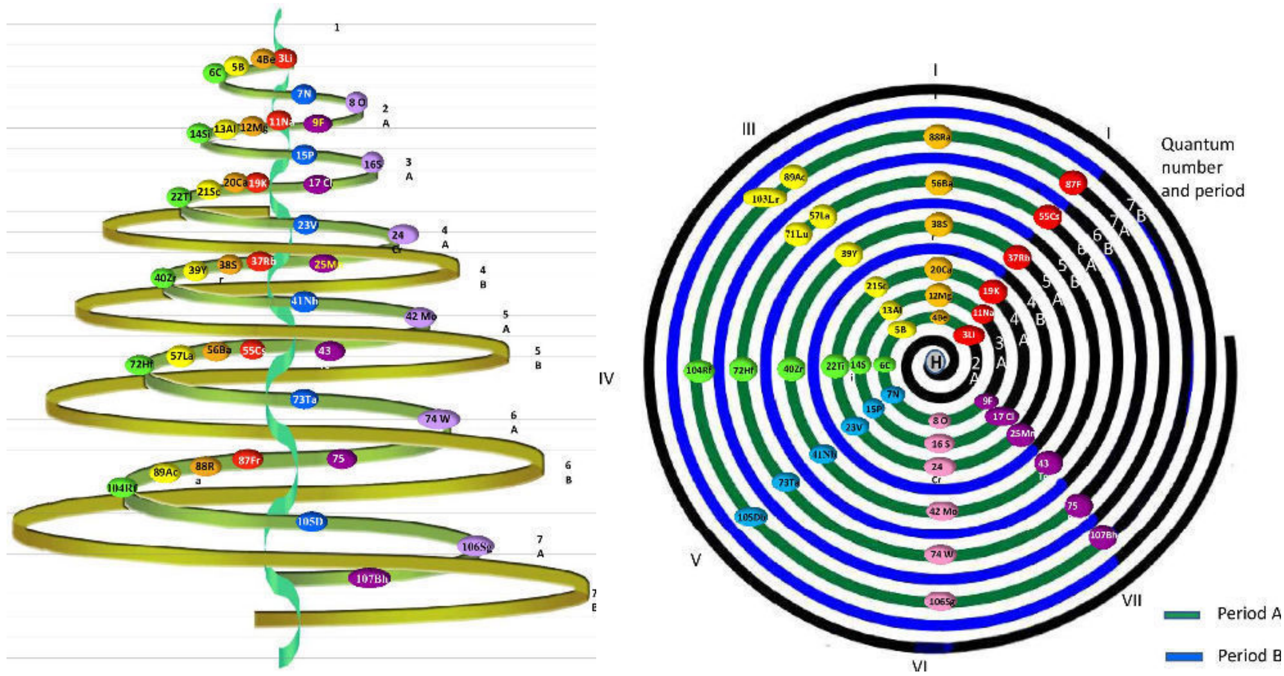

Figure 18. Right, the configuration of elements in Group A in the gastropod shell, and left, the apical view of the spiral model. The elements of the same group have the same color.

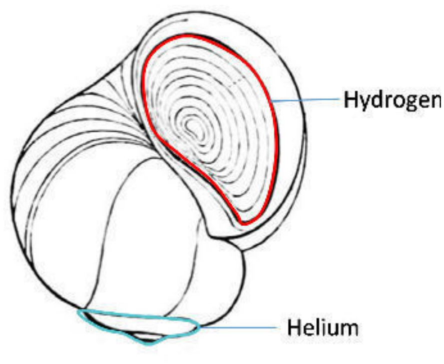

Figure 19. The snail shell model applied to the relationship between helium and hydrogen.

the gastropod shell model.

On the first level, two elements had quantum number 1, where hydrogen is in the corresponding opening of the snail and helium in the middle corresponds to the protoconch of the snail shell (**Figure 19**).

Hydrogen is located at the opening of the first snail shell, which has a horizontal orientation, whereas the helium vortex is located at the center of the gastropod main shell. This structural model revealed that the radius of the snail aperture is larger than that of the apex.

Therefore, the atomic radius of the helium atom, *i.e.* 31×10^{-12} m, is smaller than the hydrogen radius, *i.e.* 53×10^{-12} m, although it has a higher atomic number.

5. Group S

Another group associated with Period A is Group S, including the so-called iron group. This group includes 12 elements, which are found in four protruding spikes of the main shell, which are connected with Period A, namely, with 4A, 5A, 6A, and 7A, containing three elements each (Figure 20).

These elements are referred to as VIII, IX, and X groups. They are distinguished from other elements because they have obvious similarities in their chemistry and electronegativity but are not related to any of the other groups.

When Group S is added to Group A, three more groups are added VIII, IX, and X, and we get the following arrangement (Table 2).

The atomic number of elements in the same group increases in different steps based on the same rule 18, 32, and 32.

This order can be represented in a spiral or 3D spiral shell and a 2D spiral model (Figure 21).

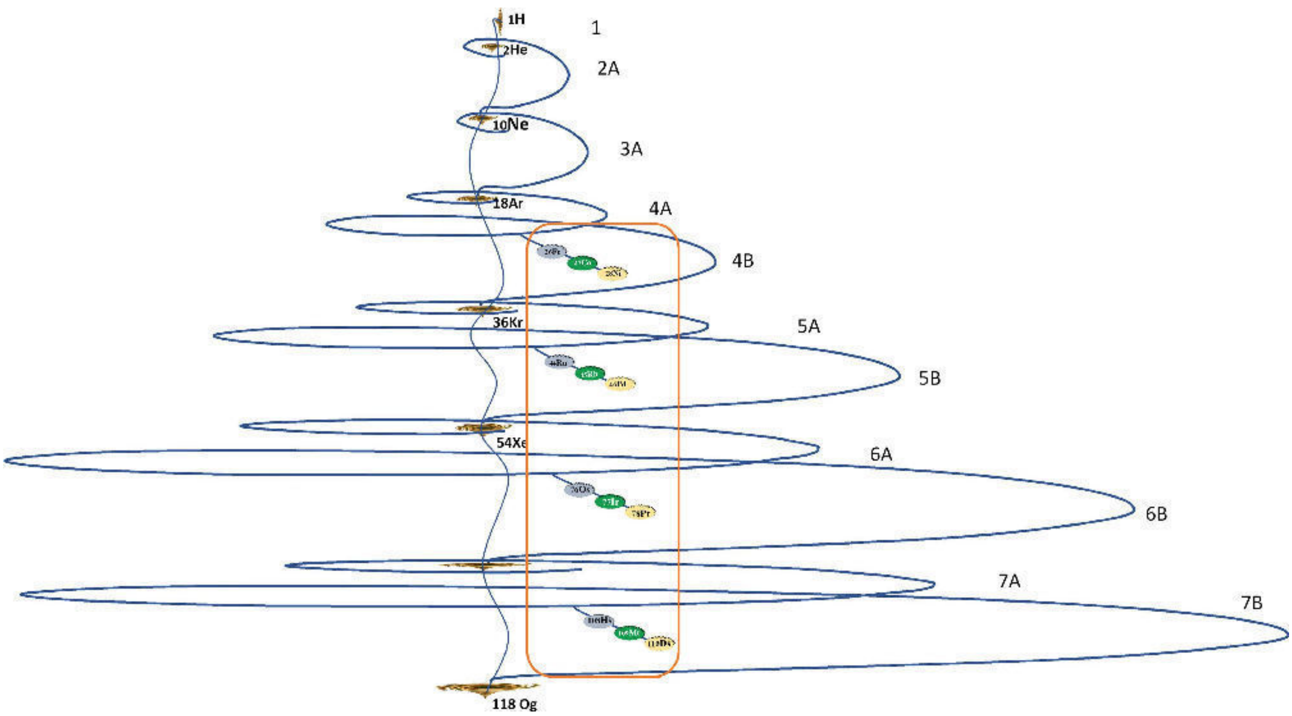

Figure 20. Group S includes 12 elements, which are present in four shell spikes

Table 2. Period A and Group S elements adding to the tabe VIII, XI and X groups.

	I	II	III	IV	V	VI	VII	VIII	IX	X
1A	1H									
2A	3Li	4Be2	5B3	6C4	7N	8O	9F			
3A	11Na	12Mg	13Al	14Si	15P	16S	17Cl			
4A	19K	20Ca	21Sc	22Ti	23V	24Cr	25Mn	26 Fe	27Co	28Ni
5A	37Rb	38Sr	39Y	40Zr	41Nb	42Mo	43Tc	44 Ru	45Rh	46Pd
6A	55Cs	56Ba	57La 71Lu	72Hf	73Ta	74W	75Re	76 Os	77Ir	78Pt
7A	87Fr	88Ra	89Ac 103Lr	104Rf	105Db	106Sg	107Bh	108Hs	109Mt	110Ds

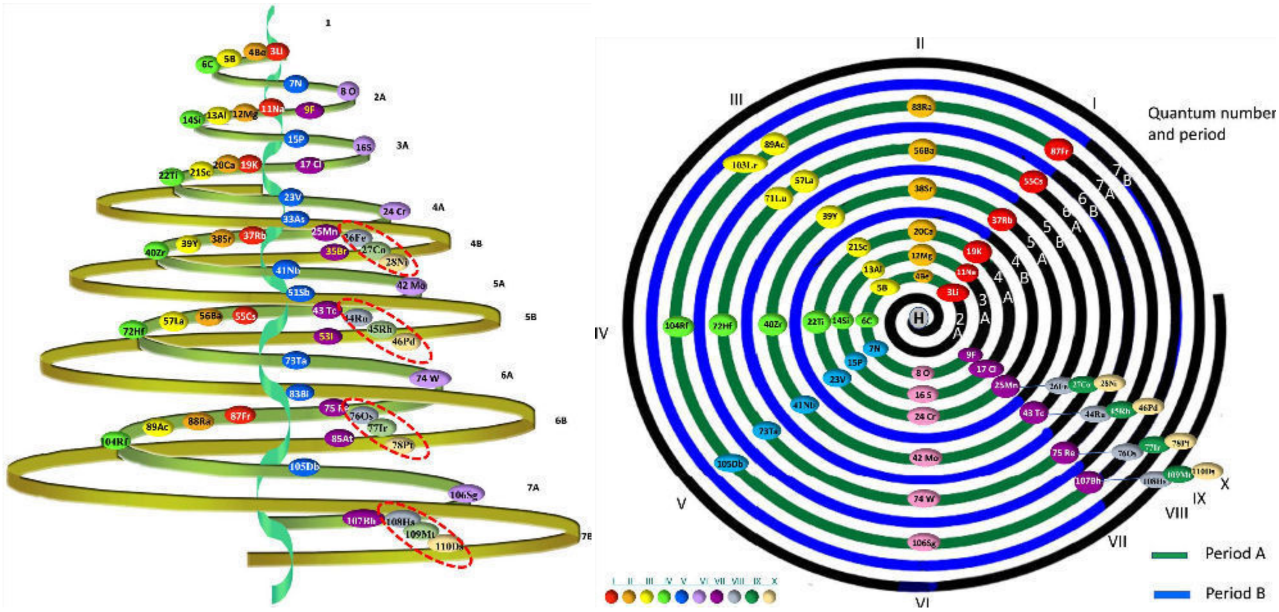

Figure 21. Left: Apical and lateral views of Group A and Group S as protruding spikes. Right: The relationship between elements in Period A and Groups S, VIII, IX, and X.

Table 3. Period B elements.

Level + period	I	II	III	IV	V	VI	VII
4B	29Cu	30Zn	31Ga	32Ge	33As	34Se	35Br
5B	47Ag	48Cd	49In	50Sn	51Sb	52Te	53I
6B	79Au	80Hg	81Ti	82Pb	83Bi	84Po	85At
7B	111Rg	112Cn	113Nh	114Fl	115Mc	116Lv	117Ts

6. Element Configuration in Period B

Period B is added to Periods A, from Levels 4 to 7. Each period has seven elements in a similar way to Period A.

The elements in Period B of the same group in different levels have an increasing atomic number based on rules 18 and 32. These elements are arranged in seven groups (columns) and four energy levels (rows) (Table 3).

This arrangement can be presented as a spiral or 3D gastropod shell model or as a spiral model (Figure 22).

7. Combination of Periods A and B

The combination between Periods A and B can be presented in seven groups in the spiral model (Figure 23).

The combination of the element configuration in Periods A and B sheds light on the relationship between different elements represented in a periodic table (Table 4).

It is worth noting again that there are two elements in Periods 6A and 7A in Group III.

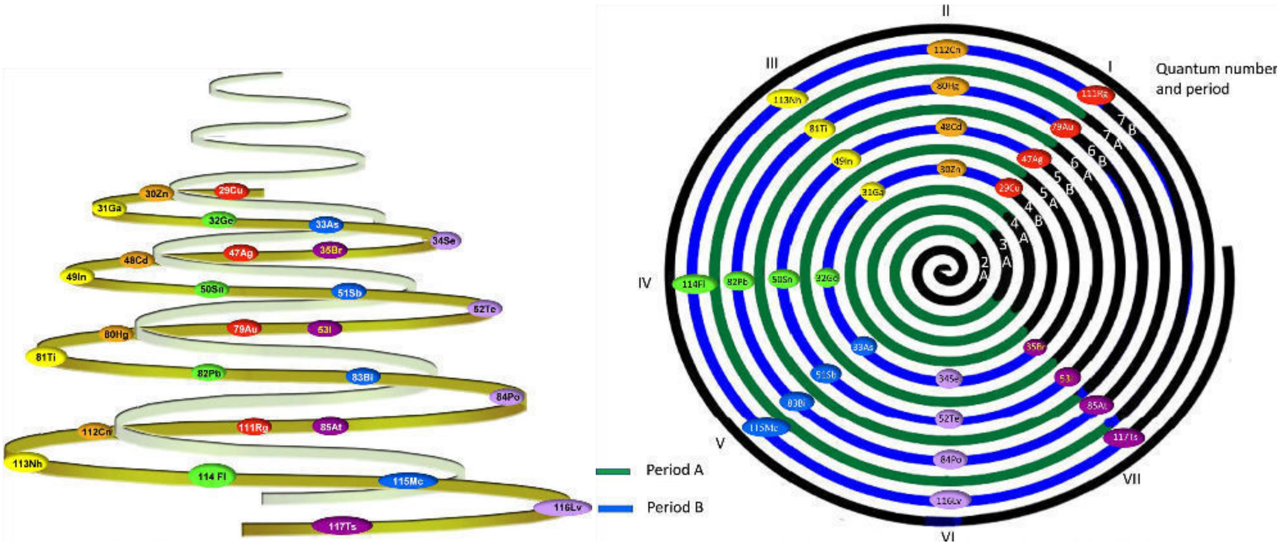

Figure 22. Left: Period B element configuration of lateral view of the gastropod model shell. Right: Period B (blue lines) element configuration in a spiral model (apical view).

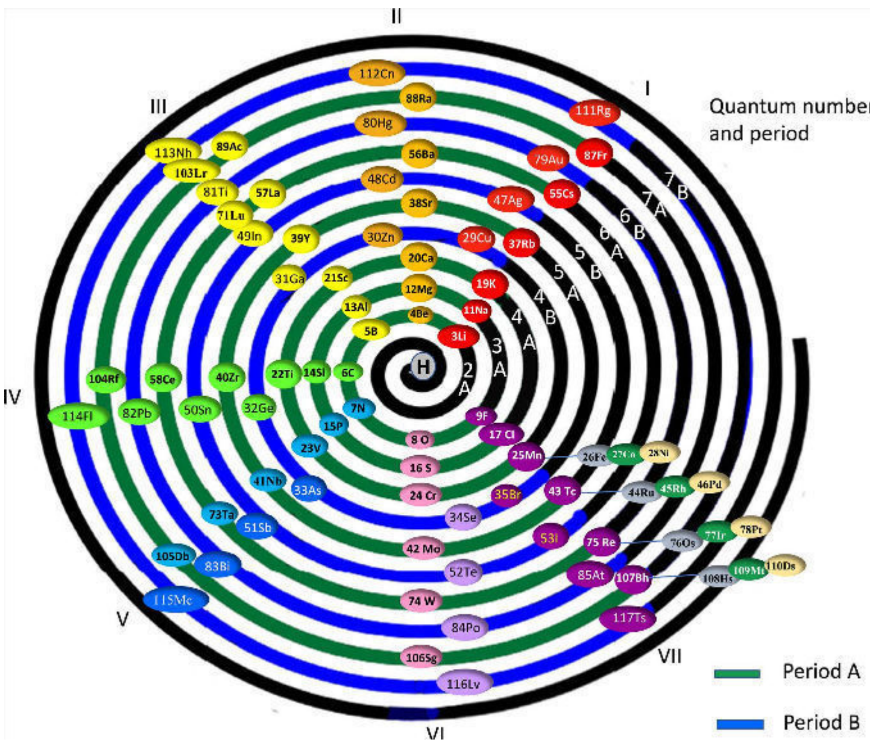

Figure 23. The combination of Groups A and B in a spiral model.

This helps us solve the problem of finding lawrencium. On the one hand, the atomic number of element 57La adds 18 to that of element 39Y in 6A. Another criterion that confirms periodicity is the difference of 10 between the element 103Lr in Period A and element 113Nh in Period B at the same level.

8. Periods A and B and Group 0

Noble gases are classified as Group 0 and Period 0 so that they are separated

Table 4. Elements of Period A and Period B and the difference of ten between elements of Period A and Period B in the same level elements of Period A and Period B and the difference of ten between elements of Period A and Period B in the same plane.

Level period	I	II	III	IV	V	VI	VII	VIII	IX	X
10	1H									
2A	3Li	4Be2	5B3	6C4	7N	8O	9F			
3A	11Na	12Mg	13Al	14Si	15P	16S	17Cl			
4A	19K	20Ca	21Sc	22Ti	23V	24Cr	25Mn	26Fe	27Co	28Ni
B	29Cu	30Zn	31Ga	32Ge	33As	34Se	35Br			
5A	37Rb	38Sr	39Y	40Zr	41Nb	42Mo	43Tc	44Ru	45Rh	46Pd
B	47Ag	48Cd	49In	50Sn	51Sb	52Te	53I			
6A	55Cs	56Ba	57La 71Lu	72Hf	73Ta	74W	75Re	76Os	77Ir	78Pt
B	79Au	80Hg	81Ti	82Pb	83Bi	84Po	85At			
7A	87Fr	88Ra	89Ac 103Lr	104Rf	105Db	106Sg	107Bh	108Hs	109Mt	110Ds
B	111Rg	112Cn	113Nh	114Fl	115Mc	116Lv	117Ts			

from horizontal Periods A and B and vertical eight groups when arranged in the new periodic table.

The group of noble gases is located at the center of the gastropod shell 3D model (Figure 24).

When presented in a spiral model, noble gases can be presented at the center of the spiral or on the sides (Figure 25).

9. Periods C and D

Lanthanides and actinides are groups of elements in the periodic table often referred to as rare earth or "inner transition metals". They are listed below as the main part of the standard periodic table.

In the gastropod shell model, these two periods are located at the aperture of the gastropod, consisting of two rings at the inner and outer lips, containing Periods C and D, respectively.

Lanthanides are elements with atomic numbers from La57 to Lu71 and are located at the inner lip of the aperture. These elements are categorized in Group C, and the element La57 marks the boundary to transition metal elements. However, elements La57 and Lu71 belong to Period A. Rules 8, 8, 18, 18, 32, and 32 are maintained between element 39Y in Group A and La57, and the rules of difference by 10 between Periods A and B are maintained between element Lu71 and Ti81, 21Sc and 31Ga, or 39Y and 49In, 103Lr and 113Nh, etc. This criterion helps us check the correctness of element configuration.

Thus, the group of lanthanides in Period 6A of Group III begins with the element La57, making a loop and ends with the element 71 (lutetium), which is in

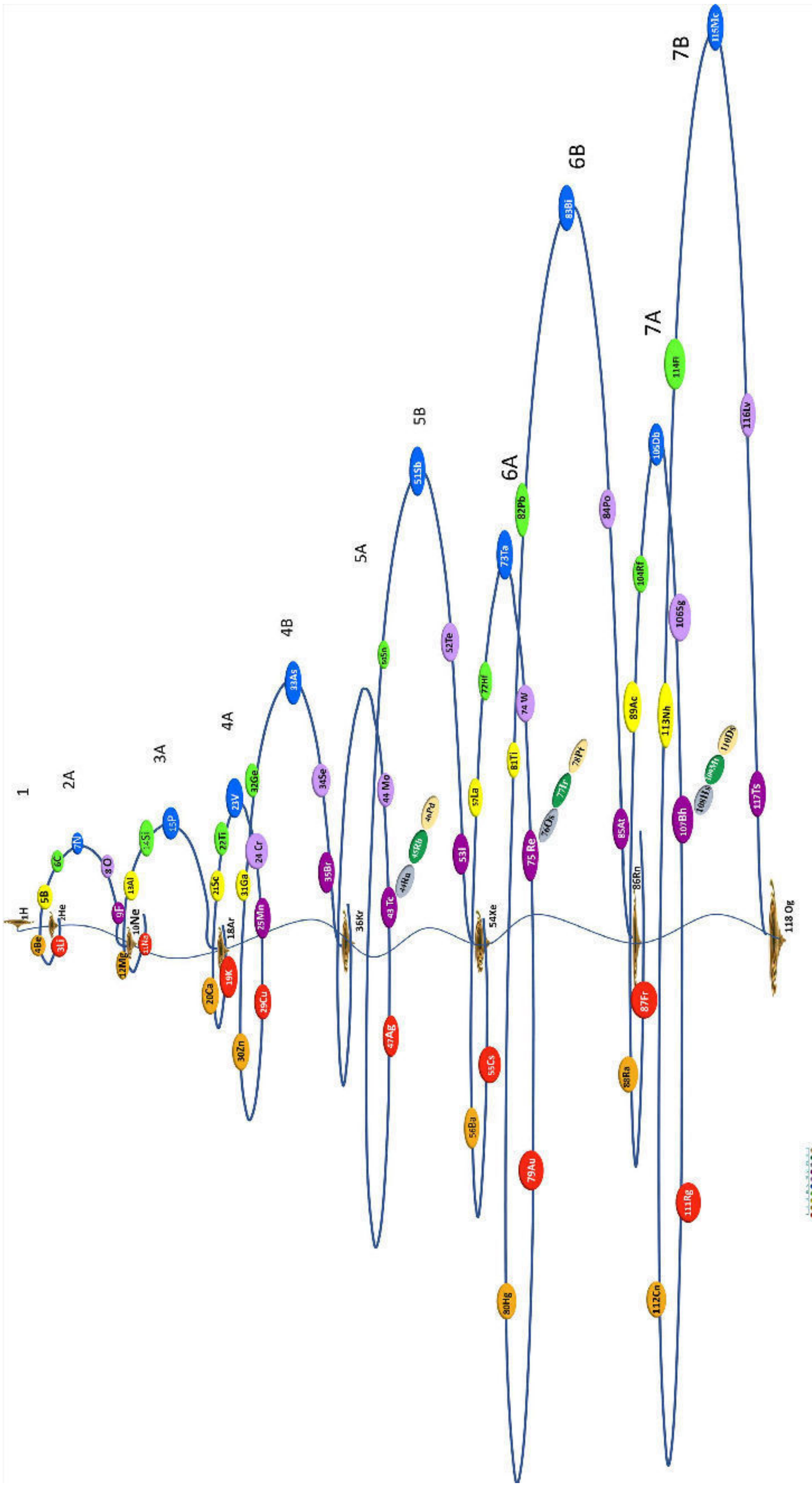

Figure 24. Noble gases are localized at the center of the gastropod shell, long the columella.

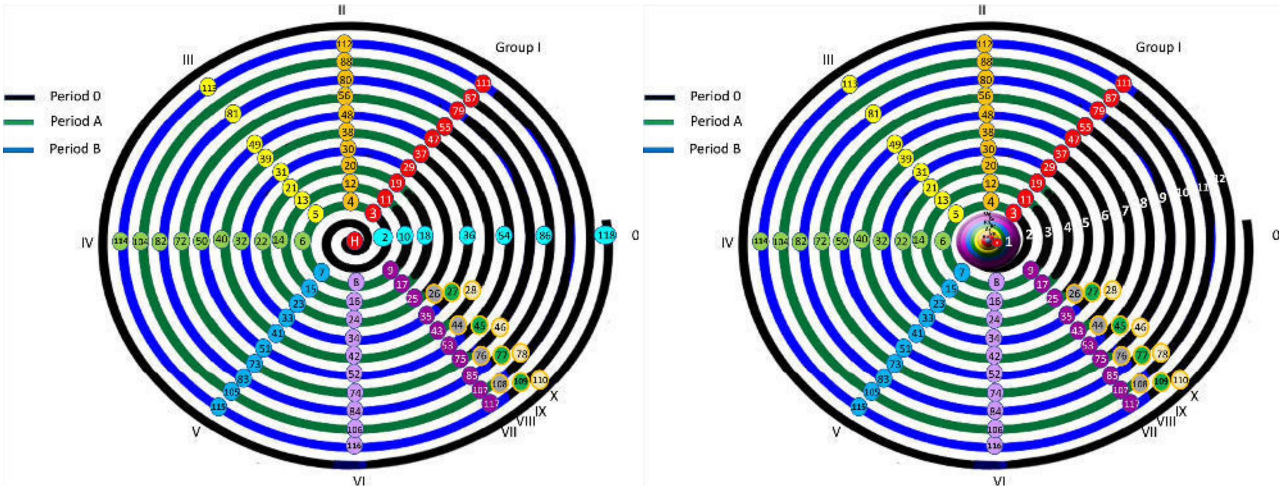

Figure 25. (Left) The spiral model with Periods A and B, where noble gases in the middle are in different layers, (right) noble gases on the lateral side.

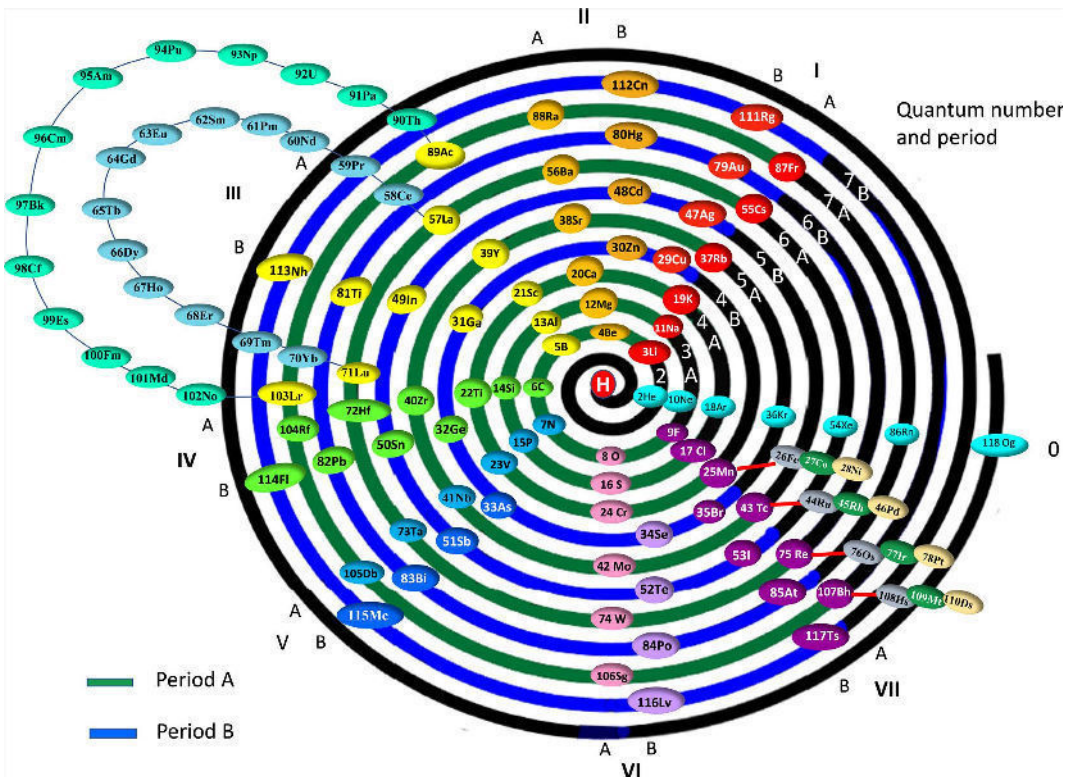

Figure 26. The spiral view of the element configuration in the C and D Periods.

the same Period 6A and Group III. Similarly, Period D contains elements between elements 89 (actinium) looping in quantum Level 7A in Group III and ends with element 103 (lawrencium) in the same Group III in quantum Level 7A (Figure 26).

Therefore, one of the oxidation states that both series have is +3. Although actinides have variable oxidation states of +3, +4, +5, +6, and +7, when Groups C and D are arranged in the 3D spiral, they are located based on the aperture (Figure 27).

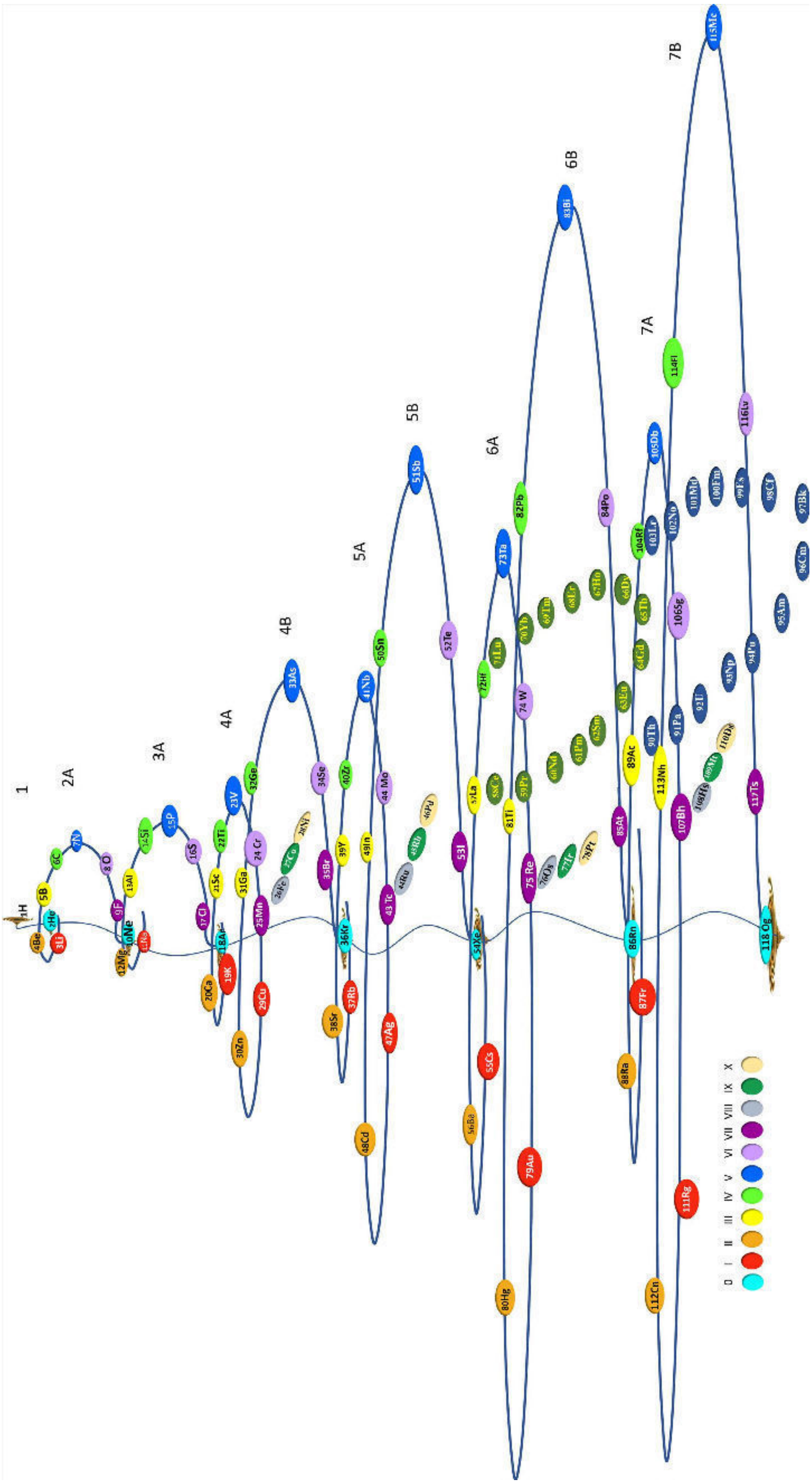

Figure 27. The 3D spiral model including all elements in the periodic table.

However, when the new arrangement I presented as tabular, lanthanides and actinides are inserted within the table, starting in Group III, forming a loop, and then returning to Group III (Table 5).

This is a new periodic table, comprising seven levels with colors ranging from red to violet. In each level, there is zero, one, two, or four periods. In the first level, no period was assigned, except for two elements, hydrogen and helium. In the second and third levels, Periods A and 0 are assigned. In each Period A, seven elements are numbered I to VII, and in Period 0, one noble gas is assigned. In

Table 5. The new periodic table arrangement.

Energy Level	period	0	I	II	III	IV	V	VI	VII	VIII	IX	X
		0	+1	+2	+3	+4	-3	-2	-1			
1	0		1 H									
	0	2 He										
2	A		3 Li	4 Be	5 B	6 C	7 N	8 O	9 F			
	0	10 Ne										
3	A		11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl			
	0	18 Ar										
4	A		19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni
	B		29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br			
	0	36 Kr										
5	A		37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd
	B		47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I			
	0	54 Xe				58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd
6	A		55 Cs	56 Ba	57 La	70 Yb	69 Tm	68 Er	67 Ho	66 Dy	65 Tb	
	A				71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt
	B		79 Au	80 Hg	81 Ti	82 Pb	83 Bi	84 Po	85 At			
	0	86 Rn				90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm
7	A		87 Fr	88 Ra	89 Ac	102 No	101 Md	100 Fm	99 Es	98 Cf	97 Bk	
	A				103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds
	B		111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts			
	0	118 Og										

Levels 3 and 4, two Periods A and B are assigned, each with seven elements, and a zero Period, each with one noble gas. In Periods 6 and 7, there are Periods A and B with seven elements each, Period B connected to Period 0 with noble gas in each level, and C in the sixth and D in the seventh with fourteen elements. These periods are connected to Period A at each level and correspond to the lips of the shell aperture.

Therefore in the new table, there are 20 rows. Furthermore, there are eleven columns named groups and enumerated from 0 to X. Each group has elements with similar chemical properties.

10. Mathematical Rules of Periodicity

The gastropod shell has seven vortices associated with the levels. Each vortex can have 0, 1, 2, or 4 turns or periods (**Table 6**).

The number of elements in each level depends on the number of periods and the presence or absence of lateral spikes.

To calculate the number of elements (N*e*) in each level for the first five levels, the following equation is used:

$$Ne = 2\,(l + 1)^2$$

Moreover, for the sixth and seventh levels:

$$Ne = 2\,(l^2)$$

where l is the number of periods in each level.

For example, in the first level, there is no period, with two elements; in the second and third levels, there is one period each $2\,(1 + 1)^2 = 8$, with 8 elements; in the fourth and fifth levels, there are two periods each, $2\,(2 + 1)^2 = 18$; and in the sixth and seventh levels, there are four periods each, with $2\,(4)^2 = 32$ elements where Periods C and D have 14 elements each; therefore, they are considered as two periods.

The atomic number of elements in the same group occurring in the same period increases based on rules 2, 8, 8, 18, 18, 32, and 32, for example, the first

Table 6. The 7 quantum number elements with increasing number of elements according to the rules 2, 8, 8, 18, 18, 32, and 32.

Principal Quantum number (level)	The name of the period	Number of revolutions	Number of elements	The elements
1	0	0	2	1-Hydrogen, 2-Helium
2	A	1	8	3-Lithium … 10-Neon
3	A	1	8	11-Sodium …18-Agon
4	A + B	2	18	19-potassium…36-Krypton
5	A + B	2	18	37-Rubidium …54-Xenon
6	A + B + C	4	32	55-Cesium …. 86-Radon
7	A + B + D	4	32	87Francium…118-Oganesson

group (Table 7).

The atomic number of Period B occurring in the same group increases based on the same rule 18, 18, 32, and 32 (Table 8).

The atomic number of Period B occurring in the same level and the same group increases by 10 (Table 9).

Table 7. The atomic number of the elements follows the rules 2, 8, 8, 18, 18, 32, and 32.

I
1H
3Li
11Na
19K
37Rb
55Cs
87Fr

Table 8. The atomic number of the elements of Period B in the same group follows the same rule 18, 18, 32 and 32.

Level + period	II
4B	30Zn
5B	48Cd
6B	80Hg
7B	112Cn

Table 9. The ratio between the elements of Period A (blue color) and Period B (red color). The atomic number of the elements of the same group in Period B increases by 10 compared to Period A.

Level period	I	II	III	IV	V	VI	VII	VIII	IX	X
10	1H									
2A	3Li	4Be2	5B3	6C4	7N	8O	9F			
3A	11Na	12Mg	13Al	14Si	15P	16S	17Cl			
4A	19K	20Ca	21Sc	22Ti	23V	24Cr	25Mn	26Fe	27Co	28Ni
B	29Cu	30Zn	31Ga	32Ge	33As	34Se	35Br			
5A	37Rb	38Sr	39Y	40Zr	41Nb	42Mo	43Tc	44Ru	45Rh	46Pd
B	47Ag	48Cd	49In	50Sn	51Sb	52Te	53I			
6A	55Cs	56Ba	57La 71Lu	72Hf	73Ta	74W	75Re	76Os	77Ir	78Pt
B	79Au	80Hg	81Ti	82Pb	83Bi	84Po	85At			
7A	87Fr	88Ra	89Ac 103Lr	104Rf	105Db	106Sg	107Bh	108Hs	109Mt	110Ds
B	111Rg	112Cn	113Nh	114Fl	115Mc	116Lv	117Ts			

11. Discussion

The structure of the new periodic system is based on the 3D model of a gastropod shell, which can be represented as a helical 3D and spiral or tabular 2D that provides a blueprint for the formation and configuration of elements, as well as a complete explanation of periodicity, which explains the repetition of all period lengths. Hence, it is called the periodic system rather than the periodic table based on the law of sevenths and octaves like musical notes with repetitions in element properties that the periodic system captures so beautifully.

The new periodic system provides precise and valid laws about chemical elements.

In this new periodic system, the problems related to the assignment of the hydrogen, helium, lanthanide, and actinide groups are solved. No gaps are observed between the elements, and the regularity of the periodic table is presented to the highest degree.

In the conventional modern periodic table, elements hydrogen and helium fall into Groups 1 and 18, respectively, the alkali and noble gases. In the new system, helium is at the top of the noble gases because it is nonreactive, and at the top of the alkaline earth metals, such as beryllium, magnesium, and calcium because it contains two electrons.

Hydrogen is placed at Level I of Group I and the vicinity of the halogens in Group VII. All halogens are the last element before the following noble gases, and hydrogen in connection with helium occupies the same position as halogens in connection with noble gases. Simultaneously, hydrogen is at the top of the carbon group because its atom has a half-filled outer shell like carbon. Furthermore, this arrangement provides a perfect triad of atomic numbers 1H, 9F, and 17Cl.

Many textbooks and wall charts of the periodic table showed that Group 3 consisted of scandium, yttrium, lanthanum, and actinium. A similar number of tables show a difference in the last two elements, lutetium, and lawrencium.

By placing lanthanides and actinides in the opening of the gastropod shell, we solve the problem in Group III. According to the new system, the group of lanthanides starts with lanthanum in Group III, makes a loop, and returns to Group III, the same is true for the group of actinides, which starts with actinium in Group III and closes the loop with lawrencium in Group III. This explains the electron configuration of lanthanum and actinium with their partially filled d-shells. Therefore, all four elements lanthanum, lutetium, actinium, and lawrencium are included in Group III.

This arrangement is justified because lutetium and lawrencium, as the heavier analogs of scandium and yttrium, are assigned to the d block, as are lanthanum and actinium, which are considered to lie on the boundary between the f and d blocks. Moreover, the rule 8, 8, 18, 18, 32, and 32 is maintained between the element 39Y in Group A and La57, and the rule of difference by 10 between Periods A and B is maintained between the element Lu71 and the element Ti 81, 103Lr and 113Nh. Finally, the three elements 39Y, Lu71, and 103Lr form a perfect triad.

12. Conclusions

The proposed design for the periodic table of elements presented in this article has the potential to significantly impact the field of chemistry. By using a 3D model of the gastropod shell structure, the authors suggest a new mechanism for understanding how the elements were formed and how their configuration in the system determines their chemical and physical properties. The new periodic system is symmetrical and elegant, and reflects the laws of nature, which could inspire new approaches to designing scientific systems.

While the proposed design has not yet been widely accepted by the scientific community and requires further validation, it may stimulate discussion and further research into the arrangement and classification of elements. It could also contribute to the ongoing development of the field of chemistry and potentially lead to significant changes in the way that chemistry is taught and understood. Overall, the proposed design offers a novel and exciting perspective on the periodic table of elements and has the potential to advance our understanding of the fundamental building blocks of matter.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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