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## BUILDING MENDELEEV TABLE ON THE BASIS OF ATOM PLANETARY MODEL WITH SEVERAL ELECTRONS SATELLITES

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### **Key words:**

Atom, periodic law, chemical element, atomic number, table of elements, Mendeleev, inert gas, electron shell, electron orbit

### **The Summary:**

Atomic number of a chemical element is determined not by the number of protons in its nucleus, but by the particularities of its electronic shell structure. Electronic shell structure particularities include the presence therein of such or another number of satellite electron groupings composed with such or another number of electrons, the satellites composed as groupings with different number of electrons occupying circum-nuclear orbits differently distanced from the atomic nucleus. Different distancing of electronic orbits from the atom's nucleus results from that satellites of smaller mass (smaller screening area), similarly to astronomic planetary (satellite) systems, have to place themselves closer to the atom's nucleus, while those of greater mass have to do it on the periphery of the electronic shell. Atom's electronic shell has to be composed with a certain number of electronic orbits, on each of which have to turn in opposite directions a pair of identical groupings of certain number of electrons. Electronic shells of different elements atoms distinguish themselves by their ranges, which are the numbers of their farthest orbits. Shells of the same ranges compose Groups and distinguish themselves by fullness of their orbits. The known chemical elements make up 14 Groups that have total of 14 orbits, reserved for electronic groupings of different numbers of electrons. The first of these orbits is reserved for a pair of electrons, the second – for a pair of dyads, the third – for a pair of triads, and the last – for a pair of groupings of 14 electrons. The range of each Group equals the number of the last for this Group electronic orbit, placed on the periphery of the respective electronic shell. The external orbit number of each Group equals its range. Groups may have vacant orbits. Inert gases shell orbits, except vacant, are fully filled with respective electronic groupings.

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The proposed article enlarges and completes my previous ones [1, 2], in which there was already expressed the idea that the atomic number of a chemical element determines itself not by the number of protons in its nucleus, but by the particularities of its electronic shell structure. As such electronic shell structure particularities I regard the presence therein of such or another number of satellite electron groupings composed with such or another number of electrons, the satellites composed as groupings with different number of electrons occupying circum-nuclear orbits differently distanced from the atom's nucleus. Such different distancing of electronic orbits from the atom's nucleus results from that satellites of smaller mass (smaller screening area), similarly to astronomic planetary (satellite)

systems, have to place themselves closer to the atom's nucleus, while those of greater mass have to do it on the periphery of the electronic shell. Such point of view cardinally distinguishes from the modern quantum-mechanical conceptions, according to which atom's electronic shells have to be composed with separate electrons, each of which placed on its separate orbit.

According to my conception, an atom's electronic shell has to be composed with several electronic orbits, on each of which has to revolve in opposite directions a pair of identical groupings composed with several number of electrons. On the orbit nearest to the atom's nucleus there have to revolve two groupings composed with single electron, while the groupings of other orbits have numbers of electrons equaling the orbit's number of order, if to calculate beginning from the nucleus. So the second orbit is filled with groupings of two electrons (dyads), the third – with triads, the fourth – with quadriads, and so on. Such idea has been already expressed earlier in my articles [3, 4] concerned with helium atom structure.

Different elements electron shells distinguish themselves by ranges that are the ordinal numbers of the farthest orbits. If for instance a shell has range 5, it has 5 orbits, of which there must be obligatorily filled only the last, i. m. the farthest. Shells of the same ranges compose Groups and distinguish themselves by fullness of their orbits.

In the here below proposed Table 1 there are represented 15 Groups of electron shells, each of which corresponds to a certain chemical element, one of the Groups (Group 2) being no more than probable. Each of the Groups is characterized by that all its shells must have the external orbit with order equaling its range, while the presence of other orbits for elements of the Group may not be obligatory. The number of electronic orbits in a Group generally is equal to its range.

Table 1

Group's designation	1)	2)-1	2) probable	3)	4)	5)
Shells (chemical elements)	1	2	1+2=3 2=2	1+2+3=6 2+3=5 1+3=4 3=3	1+2+3+4=10 2+3+4=9 1+3+4=8 3+4=1+2+4=7	1+2+3+4+5=15 2+3+4+5=14 1+3+4+5=13 3+4+5=12 2+4+5=11
Less probable shells (elements)				2+4=6 1+4=5 4=4	1+4+5=10 4+5=9 3+5=8 etc.	4+5+6=15 1+2+5+6=14 2+5+6=13 etc.
<p>Notes: 1) Group's designation consists with the number of the farthest orbit n) minus the number of the empty (vacant) orbit –m (if it exists).            2) Table's denomination of shells (elements) is composed with numbers of their orbits (left part) and the atomic number of the element (right part). For instance 1+3+4=8 signifies that in the shell of the element 8 (oxygen) the groupings of 1, 3, and 4 electrons occupy the first, third, and fourth orbits.            3) Less probable elements are those from higher Groups that happen in nature much more rarely.</p>						
6)-3		7)			8)	
1+2+4+5+6=18 2+4+5+6=17 1+4+5+6=16 4+5+6=15		1+2+3+4+5+6+7=28 2+3+4+5+6+7=27 1+3+4+5+6+7=26 3+4+5+6+7=25 2+4+5+6+7=24 1+4+5+6+7=23 4+5+6+7=22 3+5+6+7=21 2+5+6+7=20 1+5+6+7=19			1+2+3+4+5+6+7+8=36 2+3+4+5+6+7+8=35 1+3+4+5+6+7+8=34 3+4+5+6+7+8=33 2+4+5+6+7+8=32 1+4+5+6+7+8=31 4+5+6+7+8=30 3+5+6+7+8=29	
5+6+7=2+3+6+7=18 1+3+6+7=1+4+5+7=17 3+6+7=4+5+7=16 etc.		2+5+6+7+8=3+4+6+7+8=28 1+5+6+7+8=2+4+6+7+8=27 5+6+7+8=2+3+6+7+8=26 etc.			2+3+4+5+6+7+9=1+3+4+5+6+8+9=36 etc.	
9)		10)-1			11)	

$1+2+3+4+5+6+7+8+9=45$ $2+3+4+5+6+7+8+9=44$ $1+3+4+5+6+7+8+9=43$ $3+4+5+6+7+8+9=42$ $2+4+5+6+7+8+9=41$ $1+4+5+6+7+8+9=40$ $4+5+6+7+8+9=39$ $3+5+6+7+8+9=38$ $2+5+6+7+8+9=37$	$2+3+4+5+6+7+8+9+10=54$ $3+4+5+6+7+8+9+10=52$ $2+4+5+6+7+8+9+10=51$ $2+3+5+6+7+8+9+10=50$ $4+5+6+7+8+9+10=49$ $3+5+6+7+8+9+10=48$ $2+5+6+7+8+9+10=47$ $2+4+6+7+8+9+10=46$  Elements of the Group 11): $2+3+4+5+6+7+8+9+11=55$ $3+4+5+6+7+8+9+11=53$	$1+2+3+4+5+6+7+8+9+10+11=66$ $2+3+4+5+6+7+8+9+10+11=65$ $1+3+4+5+6+7+8+9+10+11=64$ $3+4+5+6+7+8+9+10+11=63$ $2+4+5+6+7+8+9+10+11=62$ $1+4+5+6+7+8+9+10+11=61$ $4+5+6+7+8+9+10+11=60$ $3+5+6+7+8+9+10+11=59$ $2+5+6+7+8+9+10+11=58$ $1+5+6+7+8+9+10+11=57$ $5+6+7+8+9+10+11=56$ $4+6+7+8+9+10+11=55$ $2+6+7+8+9+10+11=53$
$1+5+6+7+8+10=37$ etc. 12)	$1+3+4+5+6+7+8+9+11=54$ etc. 13)-5	$1+6+7+8+9+10+12=53$ etc. 14)
$1+2+3+4+5+6+7+8+9+10+11+12=78$ $2+3+4+5+6+7+8+9+10+11+12=77$ $1+3+4+5+6+7+8+9+10+11+12=76$ $3+4+5+6+7+8+9+10+11+12=75$ $2+4+5+6+7+8+9+10+11+12=74$ $1+4+5+6+7+8+9+10+11+12=73$ $4+5+6+7+8+9+10+11+12=72$ $3+5+6+7+8+9+10+11+12=71$ $2+5+6+7+8+9+10+11+12=70$ $1+5+6+7+8+9+10+11+12=69$ $5+6+7+8+9+10+11+12=68$ $4+6+7+8+9+10+11+12=67$	$1+2+3+4+6+7+8+9+10+11+12+13=86$ $2+3+4+6+7+8+9+10+11+12+13=85$ $1+3+4+6+7+8+9+10+11+12+13=84$ $3+4+6+7+8+9+10+11+12+13=83$ $2+4+6+7+8+9+10+11+12+13=82$ $1+4+6+7+8+9+10+11+12+13=81$ $4+6+7+8+9+10+11+12+13=80$ $3+6+7+8+9+10+11+12+13=79$  Probably inexistent elements: $1+2+3+4+5+6+7+8+9+10+11+12+13=91$ $2+3+4+5+6+7+8+9+10+11+12+13=90$ $1+3+4+5+6+7+8+9+10+11+12+13=89$ $3+4+5+6+7+8+9+10+11+12+13=88$ $2+4+5+6+7+8+9+10+11+12+13=87$ $1+4+5+6+7+8+9+10+11+12+13=86$	$1+2+3+4+5+6+7+8+9+10+11+12+13+14=105$ $2+3+4+5+6+7+8+9+10+11+12+13+14=104$ $1+3+4+5+6+7+8+9+10+11+12+13+14=103$ $3+4+5+6+7+8+9+10+11+12+13+14=102$ $2+4+5+6+7+8+9+10+11+12+13+14=101$ $1+4+5+6+7+8+9+10+11+12+13+14=100$ $4+5+6+7+8+9+10+11+12+13+14=99$ $3+5+6+7+8+9+10+11+12+13+14=98$ $2+5+6+7+8+9+10+11+12+13+14=97$ $1+5+6+7+8+9+10+11+12+13+14=96$ $5+6+7+8+9+10+11+12+13+14=95$ $4+6+7+8+9+10+11+12+13+14=94$ $3+6+7+8+9+10+11+12+13+14=93$ $2+6+7+8+9+10+11+12+13+14=92$ $1+6+7+8+9+10+11+12+13+14=91$ $6+7+8+9+10+11+12+13+14=90$ $5+7+8+9+10+11+12+13+14=89$ $4+7+8+9+10+11+12+13+14=88$ $3+7+8+9+10+11+12+13+14=87$
$3+6+7+8+9+10+11+13=67$ etc.	$2+7+8+9+10+11+12+13+14=86$ etc.	

The Group of the first range (the first Group) has a single shell of only one orbit, on which there revolve in opposite directions two electrons. As it was indicated earlier [5, 6], such shell belongs to hydrogen molecule  $H_2$ , the electrons revolving in opposite directions in order to stabilize the molecule's position. Besides, the electrons' opposite revolving is an obligatory condition for forming photons [7].

The shell Group of the third range (the third Group) has three shells, in one of which there may be filled all three orbits, the first of which has to be filled with two encountering electrons, the second – with two encountering dyads, and the third – with two encountering triads. The half total amount of this shell's electrons makes 6 that corresponds to atomic number of carbon. Another shell may be represented as one with filled second and third orbits that would correspond to the atomic number of bore; yet another (with first and third orbits) would correspond to beryllium, and finally the shell with only one external orbit would do to lithium.

In shells of the most of Groups all the orbits are active, i.m. proper for placing electron groupings. Nevertheless, as shows the analysis, there exist groups with vacant orbits, such as for instance «2)-1» and «10)-1», in which vacant is the first orbit, «6)-3», in which vacant is the third orbit, and «13)-5» with the vacant 5-th orbit. The existence of such vacancies was disclosed by means of analyzing atomic numbers of inert gases, for which as has shown the analysis, all the orbits of respective shell, except the vacant ones, were found completely filled. For instance the shell of neon has filled the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> orbits, i. m. all the orbits of the 4<sup>th</sup> Group; the shell of krypton has filled all 8 orbits of the 8<sup>th</sup> Group;

and the shell of argon has filled the 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> orbits, i. m. without the probably vacant third. There might come a thought that the fullness of all orbits must obligatory be a sign of a certain inert gas. However, the data of the Table 2 shows that the fullness of all orbits is proper, among other, to carbon, phosphorus, and nickel. Data about elements with all filled orbits are exposed in the Table 2.

Table 2

Elements that are not inert gases	Number of orbits	Inert gases	Number of orbits
1 H	1	2 He	1
1+2+3=6 C	3	1+2+3+4=10 Ne	4
1+2+3+4+5=15 P	5	1+2+4+5+6=18 Ar	5
1+2+3+4+5+6+7=28 Ni	7	1+2+3+4+5+6+7+8=36 Kr	8
1+2+3+4+5+6+7+8+9=45 Rh	9	2+3+4+5+6+7+8+9+10=54 Xe	10
1+2+3+4+5+6+7+8+9+10+11=66 Dy	11	1+2+3+4+6+7+8+9+10+11+12+13=86 Rn	12
1+2+3+4+5+6+7+8+9+10+11+12=78 Pt	12		

Table 2 shows that the elements with all filled orbits are in turn: whether inert gases or active elements with activities diminishing as their atomic numbers increasing.

Looking closely at the Table 1, one might recognize in the Group 3) the same element 6 (carbon), but with shells composed with different electron groupings that naturally occupy different orbits. The element 1+2+3 belongs to the third Group, while the element 2+4 does to the fourth one and quite naturally has to happen in nature rarer than the 1+2+3, because more complicated be the grouping – rarer would it happen.

The existence of the here indicated modifications of carbon, taken only as an example, inspire a curious and unexpected idea connected with ionization. According to existent scientific beliefs ions are the same chemical elements but whether deprived or provided with one or more excessive electrons. Such beliefs contradict my above expressed electron shells structure conception, but it is quite possible to presume that the carbon 2+4 might be recognized as the first of the ions of carbon 1+2+3, and the carbon 6 as its second one. Such presumption might be confirmed by quite possible differences in physical and chemical properties of the said modifications. On the other part, the true nature of ions formation might be found in the electronic clouds conception disclosed in my article [8], in which there is described that atomic or molecular matter, especially metals, is always covered with cloud of electronic gas, the latter being able to become more or less dense, provoking the matter to be ionized whether negatively or positively.

With regard to the ideas expressed concerning the carbon modifications, and once more regarding the Table 1 in part concerning the Groups 2)-1 and 2), I would like to notice that if the Group 2) were fully valuable i. m. with the existent orbit 1, it would have two elements: 1+2 and 2. The element 2 is helium, whereas element 1+2=3 has to be lithium. On the other hand, it is known that helium exists in two modifications: helium I (1+2) and its ion helium II (2) [3, 4]. The controversy might be avoided if to imagine that lithium has two modifications: 1+2 that would belong to the Group 2) and be inert gas indiscernible of helium 2, and the familiar to us lithium 3 belonging to the third Group.

On the basis of the Table 1 and imitating the architecture of the generally accepted Periodic Table of elements (see fig.1) I have composed the here represented Table 3, in which the elements of 14 Groups (without Group 2)) were inscribed continuously one by one.

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

Fig.1

Table 3

1)																	2)-1
1 H2																	2 He
3)													4)				
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
5)														6)-3			
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
7)									8)								
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
9)									10)-1								
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
11)		12)								13)-5							
55 Cs	56 Ba	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
		11)									12)						
		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb		
14)																	
87 Fr	88 Ra	89 Ac	90 Th	91 Pa	92 U	93	94	95	96	97	98	99	100	101	102	103	104
105																	

The principal coincidence of the Table 3 with fig.1 confirms the correctness of the proposed conception of chemical elements atomic structures, the conception that may serve as instrument for further improvement of scientific explorations. Besides, the proposed conception gives key to understanding the mechanism of building of the Periodic Table.

## CONCLUSIONS:

- 1) Atomic number of a chemical element is determined not by the number of protons in its nucleus, but by the particularities of its electronic shell structure;
- 2) Electronic shell structure particularities include the presence therein of such or another number of satellite electron groupings composed with such or another number of electrons, the satellites composed as groupings with different number of electrons occupying circum-nuclear orbits differently distanced from the atomic nucleus;
- 3) Different distancing of electronic orbits from the atom's nucleus results from that satellites of smaller mass (smaller screening area), similarly to astronomic planetary (satellite) systems, have to place themselves closer to the atom's nucleus, while those of greater mass have to do it on the periphery of the electronic shell;
- 4) Atom's electronic shell has to be composed with a certain number of electronic orbits, on each of which have to turn in opposite directions a pair of identical groupings of certain number of electrons;
- 5) Electronic shells of different elements atoms distinguish themselves by their ranges, which are the numbers of their farthest orbits. Shells of the same ranges compose Groups and distinguish themselves by fullness of their orbits;
- 6) The known chemical elements make up 14 Groups that have total of 14 orbits, reserved for electronic groupings of different numbers of electrons. The first of these orbits is reserved for a pair of electrons, the second – for a pair of dyads, the third – for a pair of triads, and the last – for a pair of groupings of 14 electrons;
- 7) The range of each Group equals the number of the last for this Group electronic orbit, placed on the periphery of the respective electronic shell;
- 8) The external orbit number of each Group equals its range;
- 9) Groups may have vacant orbits;
- 10) Inert gases shell orbits, except vacant, are fully filled with respective electronic groupings.

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