Proposal and Explanation of a New Periodic Table of the Chemical Elements

Feng Wen, Shejie Lu, Yabin Peng, Tao Lei, Liangji Zhong, Heng Xu and Siping Hu

ABSTRACT

In the original periodic table of chemical elements, inert gas elements are arranged to the end of each cycle, and more phenomena can be explained by valency based on the combination of inorganic substances. In this paper, a new periodic table of elements is formulated based on retaining the original number of nuclear protons, neutrons and extra nuclear electrons, referring to the square correlation between the direct ratio of sphere area and radius, and some properties of elements. In the new table, it is considered that electrons fill spheres with radius of 1, 2, 3, 4 in turn, for example, one electron filling in the first cycle corresponds to one element of hydrogen (H); the radius of the second cycle is 2, sphere area is four times that of the first cycle, then four electrons can be filled, which correspond to four elements of He, Li, Be and B; the number element of the third cycle is square of 3, 9, and so on. The new table can better explain the distribution of certain elements, which is conducive to understanding the characteristics of various elements from another angle and expanding the insight into the micro world.

1. INTRODUCTION

In the traditional periodic table of elements, a period ends with rare gas (inert) elements. Thus, electron configuration of each cycle is 2, 8, 8, 18, and the state of the compounds can be determined by these electron configurations. With the deepening of current understanding, rare gases can also participate in the reaction[1,2]. However, many reactions do not follow the arrangement rule electrons of 8818, so ionic bonds, covalent bonds and so on, have been proposed[3-5]. It is hoped that the original periodic table of elements and the properties of elements can be re-understood.

Feng Wen, Shejie Lu, Yabin Peng, Tao Lei, Liangji Zhong. Hubei University of Science and Technology, Xianning 437100, China
Heng Xu. First Affiliated Hospital of Hubei University of Science and Technology, Xianning 437100, China
Siping Hu*, Corresponding Author, Wuhan University of Technology, School of automation &Hubei University of Science and Technology, Wuhan, 430000, China
2. METHODS

In physical formulas, there is a law of inverse square in the calculation of gravity and electric field forces. For example, there is a source at a distant point, which emits gravitation or force diffusing in the whole sphere.

\[ S \text{ (sphere)} = 4\pi r^2 = \pi d^2 \]  \hspace{1cm} (1)

Where \( r \) is the radius of the sphere, \( d \) is the diameter of the sphere, and \( \pi \) is the circumference. With the increase of radius, the spherical area increases in square. If the radius is 1, the spherical area is a multiple of 1; the radius is 2, the spherical area is a multiple of 4; the radius is 3, the spherical area is a multiple of 9, and so on.

According to the above principle, the periodic table of elements can be rearranged. The first cycle is a hydrogen (H), and the radius is set to 1. In the second cycle, there are four elements: helium(He), lithium(Li), beryllium(Be) and boron(B) with the number of protons of 2-5. The radius is set to 2. Each element occupies 1/4, 2/4, 3/4 and 4/4 of the circle. Boron fills a sphere with radius of 2. The third cycle is from carbon(C) to silicon(Si), with a radius of 3 and a circle area of 9 times that of H. The fourth cycle is from phosphorus(P) to zinc(Zn). As shown in Figure 1.

![Periodic Table](image)

Figure 1. The New periodic table of element. The first cycle is arranged with 1 element, followed by 4, 9, 16, 25 and 36 in following cycles (Elements after 92 are omitted).
That is to say, for each next element, the area of the circle increased in the outer electrons is the same, which is quite different from the traditional periodic table of elements (Figure 2).

![Traditional periodic table of elements.](image)

**Figure 2. Traditional periodic table of elements.**

### 3. RESULTS AND ANALYSIS

#### 3.1 Atomic Radius

The new periodic table of elements still follows the order of atoms in the old table according to the number of protons. Changes are only made on a periodic basis. In Fig. 1, H, He, C and P rank first in the first four cycles respectively. H can also be the last one, filling the sphere with radius of 1. In addition, B, Si and Zn rank last in their cycle.

Atomic radius,

\[
\text{H:B:Si:Zn} = 0.037 \text{ nm}: 0.082 \text{ nm}: 0.117 \text{ nm}: 0.134 \text{ nm} = 1:2:3:4. 
\]

\[
\text{C: P: Ga} = 0.077 \text{ nm}: 0.110 \text{ nm}: 0.130 \text{ nm} \approx 2:3:4. 
\]

Among the atomic radii at both beginning and ending ends of the new cycles, the ratio is in good agreement with our assumption.

#### 3.2 Innovation and Stability of Chemical Elements

In the new periodic table of the elements, there is an electron outside H, He, C, P and so on, which means that there is an electron outside a complete circle to expand. It
has the strongest aggressiveness, innovation or adventurous nature in its cycle. The atoms behind them are less risky and more stable.

Chemical combination refers to that elements combine with other elements to form compound. Combination is not related to the risk and stability. It can even be considered that the compounds formed by more risky elements are more likely to dissolve, gasify, decompose and disperse. For example, carbon C forms a lot of organic matter in the human body, which is easily denatured and decomposed or even burned down at high temperature, while the compounds formed by magnesium(Mg), aluminium(Al) and Si are relatively stable on the earth's surface and have relatively high melting points.

### 3.3 Electron Excitation and H Spectrum

One electron in the outer layer of hydrogen can be excited and the electrons of H can jump to the Cycle of 1, 2, 3, 4. Then the difference in energy forms the spectrum of H atom.

Hydrogen atom is seen as a sphere with a radius of 1, with a small dot representing the proton and a charge of e. The entire sphere is electrons and the charge is -e. The power of a point on the sphere is dq, and its the action force with the proton can be expressed by coulomb formula as \( \frac{k edq}{r^2} \). If electrons and protons also need smaller particles (speed of v0) to transmit information, \( t=2r/v0 \), then the action force per unit time is \( \frac{k edq v_0}{2r^3} \), and r moves from r1(1) to r2(2,3,4...), which is theoretically a transition, but the formula for gradual moving is approximately applied, and the final unit potential energy difference between the two places is \( \frac{4(r_1^2-r_2^2)}{kedq v_0} \). The electrons are on the sphere with the same distance, and are still e after the transition. Therefore, the energy difference between the two levels is \( \frac{4(r_1^2-r_2^2)}{kedq v_0} \), equals to hv, which is the empirical formula of the traditional hydrogen atom spectrum after divided by Planck constant.

\[
\frac{1}{\lambda} = R \left( \frac{1}{n^2} - \frac{1}{n'^2} \right) \quad n = 1, 2, 3 \ldots \quad n' = n + 1, n + 2, n + 3 \ldots
\]

### 3.4 Element Configuration and Na-K Pump

According to the extranuclear electronic model in the new table, the outer layer of Na1 4 6 stills needs another 3 electrons to reach saturation state, which can be regarded as a mouth type and can be stabilized by connecting the mouth and the back with two organic groups. While for K 1 4 9 5, after the hybridization of the electron in the outermost layer, there are K 1 4 9 4, like a racket, 3 electrons are needed to create three points of action with different directions to stabilize K ions. In this way, under the same multi-bond condition, two K+ can be combined with three Na+. This is the principle of Na-K pump in organisms. As shown in Figure 3.
4. CONCLUSION AND DISCUSSION

(1) Inert elements present gaseous state under the temperature and pressure on the earth's surface. He is regarded as an inert gas as a partition in the old Table. This may be due to the low melting point and boiling point, strong instability, gas state and difficulty of He in producing reactions under the temperature and pressure on the earth's surface.

It is speculated that there are similarities in the structure between He and C and He may have a strong competitive effect on C in human body, but it happens to be inactive in the earth environment and can not interfere with the biological environment.

![Na and K atoms](image)

(2) Each electron of atom has different properties. The outermost electrons of each element are exploratory electrons. Each element, with the increase of atomic number, is an improvement and breakthrough of the former element, that is, the outermost electron represents the most important properties of each element.

The elements ranked behind have a certain inhibitory effect on the elements ranked in front. Nitrogen (N) is the element behind C, then N suppresses C.

![Sodium-Potassium Pump](image)

Figure 3. An example of the configuration of Na and K atoms and a sodium-potassium pump.
Excitation and hybridization of electrons of elements. Extranuclear electrons can be interpreted as communication channels, customs and so on for each atom to contact with the outside world. In this periodic table of elements, all electrons have an effect on the elements, and the outermost one has a greater influence. The electrons in each cycle would be seen equal, but the directions are different. For example, the second cycle of C has four electrons. Their properties are similar, but the direction of force is different. The interaction, reprogramming and new valence rules of compounds will be discussed in future work.

ACKNOWLEDGEMENTS

Thanks for the meaningful role of libraries, networks, forum materials and the people around us in the ideological process of this paper.

REFERENCES

1. Qi, Y., S.P. Chen, S.L. Gao. 2017. "A Look Back on the Formation and Development of Periodic Table of Chemical Elements," University Chemistry, 32(6):46-67.
2. Ren, Y.G. 2011. "How the Na-K pump was discovered," Biological Bulletin, 46(3): 60-62.
3. Zhou G.D., L.Y. Duan. 2017. "Structural Chemistry Foundation (Fifth Edition)," Peking University Press.
4. Michael, B. Smith. Translated by Y.M. Li and Z.P. Huang. 2018. "Higher Organic Chemistry—Reaction, Mechanism and Structure (7th Edition)," Chemical Industry Press.
5. Deng, B., Y.Z. Li, M.Z.Liu. 2013. "Practical atomic spectrometry," Chemical Industry Press.