New Periodic Table of Elements: Electron Configuration and Motion, and Formation of Simple Compound

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Abstract. Based on the number of protons and electrons in the existing element, this paper believes that the electron configuration of the element needs to be changed in order to obtain its new properties and principle of electron pairing. The new electron configuration is the square of the number of period. The first, second, third, and fourth periods contain 1, 4, 9, and 16 electrons respectively. Atoms evolve by the movement of electrons from the outer core, attracting electrons from different atoms to form compounds. When low hierarchy elements combine with high hierarchy ones, their electrons preferentially choose electrons of higher period of each other for coordination. So H atomic electrons are more likely to attract and pair with electrons of the second period of C, N and O to form compounds, while the outermost electron of O in the third period tends to pair with electrons in the fourth period of P, S and Cl. Then the special structure of ammonia and water molecules can be deduced, and the double bond characteristics of high-priced acids of P, S and Cl can also be explained. New periodic table of elements makes it easy and convenient to explain chemical phenomena and facilitate the understanding of the micro world.

1. Introduction

In the traditional Mendeleev periodic table, the period is divided according to the inert gas elements, and a lot of achievements have been made in the interpretation of atomic and molecular properties [1]. But inert gas elements have also been proven to be able to form compounds, challenging the basis for the electron configuration of the traditional periodic table. Electron configuration has been elaborated by quantum mechanics in modern times, which can explain the regular tetrahedral structure of CH₄ molecule but is difficult to perfectly explain the two dissociation energies of C-H bond in CH₄. The lone pair electron theory can be used to explain the structure of NH₃, but it is difficult to explain the coordination number of N in NH₄NO₃. The O-H bond angle in H₂O has been difficult to explain in literature [2].

This paper presents a new periodic table of elements while keeping the number of protons and electrons of the original element unchanged except that the electron period should not be configured in the form of 2, 8, 8 and 18 as that in the Mendeleev periodic table. Each layer/period of the new periodic table is filled with electrons according to the square of the number of period, with 1, 4, 9 and 16 electrons in turn [3-4]. By studying the configuration and motion of electrons around the atom, and discussing the rules of electron pairing to form compounds, it is found that sodium Na and potassium K are not the same family, with a significant difference in property, as shown in figure 1.
Figure 1. New Periodic Table of Elements, the number of the element in each period is the square of the period. There are a total number of six periods. The periods after the 7th Period are skipped.

2. Materials and experiments

2.1. Electron Configuration

As mentioned earlier, H is in the first period, and there is only one electron outside, namely H1, while there are three periods or layers outside O. There is one electron in the first period, four electrons in the second period, and three electrons in the third period, which is simplified as O1 4 3.[2]

The electron can be regarded as a kind of customs channel between an atom and the external world. An atom can have a lot of channels, which are simplified as one surface being occupied by one electron, and these channels are similar to the electron cloud in quantum mechanics. However, atoms and electrons are believed to be in motion, so the outermost electrons of H or C are being evolved from formation to development, which can be regarded as $\frac{1}{2}e$ (e/2) from 0 to 1 during simplified analysis.

The electrons are separately distributed, and transition can even occur to some electrons. There are two electrons in the outermost layer of N1 4 2, whose sixth electron corresponds to the electron in the outermost layer of C, indicating that it evolves more maturely than C. The seventh electron of N can be considered as e/2 during exploration. Such exploratory electron is extended externally based on six electrons in N. As the hierarchy of the electrons on the third period is higher, this exploratory electron is closer to the sixth electron.

Similarly, the configuration features of peripheral electrons in O and F can be concluded. For example, three electrons outside O are likely to be close with each other. The diagrams of the electron configuration of H, C, N and O are shown in figure 2. Four electrons on the second period of C, N and O are configured in a tetrahedral orientation on the sphere.

2.2. Combination of C, N and O with H

The electrons of H are only on the first layer. If H is combined with the element with a lot of protons or electrons, its peripheral electrons can be excited for transition to the second period, and then these electrons establish the mutual relationships with the electrons on the second period of C, N and O, and share some of the second-period orbit. These electrons will be eventually formed into compounds like CH₄, NH₃ and H₂O after they are saturated and bonded.

Four electrons on the second period of C form into four C-H bonds after they are connected with the electrons of H. Meanwhile, its e/2 becomes less active and the configuration area of the electron is...
reduced (it looks like that the electrons on the outermost period are lost), thus the steric hindrance of $e/2$ on the third period is reduced, and CH$_4$ therefrom formulated is more stable. The electrons on the second period of C are combined with H, indicating that C will use H to develop the potential of the second period when its energy is low while helping C to be more highly evolved. There are other electrons other than $e/2$ on the third period of N, O and F. Therefore, H is prevented from being combined with some electrons on the second period, and few H are paired. It is why steric-hindrance effect needs to be considered. Furthermore, the electrons on the third period will be less active at a low temperature, reducing steric hindrance and exposing electrons on the second period, which will be formed into hydrogen bond with H, namely, the formation of hydrogen bond in H$_2$O as indicated in figure 3. The physical configurations of H$_2$O and NH$_3$ are shown in figure 4. While H$_2$O turns into ice, two H bonds are forming. The H bond is linked to the second and third period electrons of O and is easily destroyed. As shown in figure 3, H with two dotted lines represent H bond. The physical configurations of water-ice molecules and NH$_3$ are shown in figure 4.

2.3. Compounds between C, N and O
C, N and O are the elements in the third period, with little difference in hierarchy. The electrons in the third period are more likely to be pairing between these elements to form compounds. Because the number of electrons of O is two more than that of C, the outermost electron of C is not
required specially by O. So CO₂ molecule is linear, that is, the angle between two C-O bonds is 180 degrees. But N has only one more electron than C, and its evolution is higher level than that of C, so C tends to form compounds with N together with other elements so as to prevent the excessive impact of N on C.

2.4. Acids Formed between P, S and Cl in the Fourth Period with O and H
Among the new Periodic Table of Elements as shown in figure 1, the elements in the first half period are considered to be aggressive and adventurous, and those after this period are less and less adventurous while more and more stable. H is also believed to be adventurous. The adventurous elements are likely to combine together. Therefore, C, N and O in the first third period can be directly combined with H, but Na, Mg and Al are less likely to combine with H but more likely to combine with O and –OH as they are less adventurous than H.

P, S and Cl, top three elements in the fourth period, can combine with H, O and –OH, respectively. The highest-valence acids combined by these elements are H₃PO₄, H₂SO₄ and HClO₄. The electrons of O and –OH are in the third period, and they are likely to combine with the electrons in the fourth period of P, S and Cl, for evolution similar to H. The electrons in the third period will be considered only after those in the fourth period are consumed. In view that O atoms are involved in combination are large in volume, P, S and Cl to be paired are far less than 9, a theoretical pairing quantity in the third period. To prevent the excessive impact of P, the e/2 of O trends to pair with the electrons in the third and outermost periods of P. Then they form P=O double bond, the same as S=O and Cl=O.

There are nine electrons in the third period of P, which will combine with O and OH. And -OH is more aggressive than O, thus the electrons on the third period of P can be expanded and connected with another three -OH. The formation diagram of H₃PO₄ is shown in figure 5a. The P=O bond is thought as a double bond when its rotation is not as good as P-OH bond. The two or three electrons of S and Cl form into two S=O bonds and three Cl=O bonds, as demonstrated in figure 5.

3. Results and Discussion

3.1. Property of Electron and Exploratory Electron
Every electron uniquely moves in a fixed direction, so electron is believed to occupy a certain space area. Electrons are surly not restricted to a certain space. Some electrons are likely to be configured in a sphere, but with their specific properties (just as protein receptors on biological cells). There are a certain number of protons and neutrons in an atom, but they will evolve, so do their peripheral electrons. The electron in the outermost period is considered to be exploratory and dispersely configured. Their law of motion may vary, and they explore and expand the space of the atom externally [5-9]. For example, if the electron in the outer period of H is exploratory, H will be highly adventurous, and its law of motion will be the most unstable. But for C, e/2 is much more adventurous than the elements ranking afterwards in the same period like N and O.

3.2. Evolution and bonding of CH₄
For the sake of convenience, this paper considers the electronic communication with the outside world as a priority at a certain level. The outermost electrons first form compounds with the outside. To be evolved, the element C can theoretically form compounds with N and O. But under harsher conditions such as low temperature, C will obtain less energy and combine with H into CH₄, thus C takes advantage of the exploratory electron of H to activate the motion of inter-period electrons and get such electrons evolved. In this way, H is also evolving and upgrading because it is exposed to high-level elements [2,10,11].

Since C has the outermost e/2 contracting inward and is randomly superimposed on top of the second electron, when C-H is dissociated, it is necessary to dissociate the one with e/2, and then dissociate the other C-H bonds. The first dissociation energy is lower than the second due to the repulsive effect of e/2. Therefore, if the C of methane has to get rid of one electron, the remaining C-H bonds are looked the same.

In the case of water molecules, the third period of O has three electrons, forming a large steric barrier,
so that the second electron can form up to two O-H bonds, that is, water molecules. If the third electrons of O are coming together, the two O-H bonds have a larger angle, as in ice. If the motion is greater and the third electrons are scattered, then the O-H bond formed by the second period is even more compressed, with an angle lower than that of C-H bond in CH₄. Based on the traditional lone pair theory, O has two lone pair electrons and two free electrons; if the lone pair electrons repulsion are very large, the lone pair electrons are easier to configure on both sides of O, forming a straight line, and the other two free electrons form the O-H bond with a lot of freedom in the angle of the bond. The two O-H bonds do not compress much, even configuring in 180 degrees. Obviously, the lone pair theory of O does not fit well with the experiment. The electron configuration of new element can qualitatively explain the bond angle of water and ice. The new electron configuration also explains the coordination number of N in NH₄⁺ can be up to five.

3.3. Bonding of compounds
In addition to the pairing of specific electrons, other electrons also play an important role in the bonding of compounds. More than two electrons are involved in the bonding. Take CH₄ for example, without the resonance of the electrons on the first period and the expansion of the electrons on the third period, the electron of H will be difficult to pair with the electron of C in the second period. However, H mainly reacts with the electrons of C on the second period. In terms of spatial structure, four C-H bonds are more considered to form a tetrahedral structure.

The new periodic table of elements is a new theoretical model, which can not only explain the above phenomena of ammonia and water molecules, but also help to explain and predict other phenomena, such as the atomic spectrum except hydrogen atom, the properties of iron and copper elements, and the spectra and electron cloud phenomena of other atoms [12].

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