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THEORY OF TRANSFORMATION IN ATOMIC AND NUCLEON ORBITALS

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Annotatsiya. *Elektron va boshqa to'lqinlar holatga qarab elektromagnit to'lqin paketi (EMTP) yoki energiyadir. Atom, proton va neytron orbitallari transformatsiya jarayonida atomlararo va nuklonlararo aloqalarni hosil qiladi. Bitta atom orbitalining elektronlari minimal umumiy energiya printsipiga ko'ra elektromagnit to'lqin paketida sferik, yarim sharsimon va sektor-sferik elektronlarga aylanadi va molekulyar orbitalning yo'nalishi valent elektronning holatiga bog'liq va uning bir qismidir. Atom orbital tinch va hayajonlangan holatdagi elementlar uchun elektron formulalar ishlab chiqilgan.*

Elektromagnit to'lqin paketi zaryad va spinga ega bo'lib, u elektromagnit to'lqinning yopiq uzluksiz, bir xil, barqaror, statsionar shakliga ega va u atom orbitalida bitta holatda yoki qarama-qarshi spinli yachaykada juft bo'lib joylashgan orbitallarga bo'linadi, lekin bitta orbitalda yachaykalar qatlamlarga, ya'ni kesishishi yoki bir-birining ustiga chiqishi mumkin emas. EMTP boshqa shaklga ega emas, masalan, gantelsimon yoki ellipsoid.

Atom va molekulyar orbitallarning hosil bo'lishi elektron orbitallarning yuqori tartibli elektromagnit to'lqin paketlari orqali o'zgarishi bilan juftlashish orqali sodir bo'ladi. Shuning uchun biz yangi nazariya sifatida elektromagnit to'lqinlarning o'zgarishi nazariyasini tushuntirishlar bilan, shuningdek, ekvivalent elektronlardan ekvivalent kimyoviy bog'lanishni taklif qilamiz. Kimyoviy bog'lanish har doim yagona xususiyatga ega bo'lib, s- va p-bog'larga bo'linmaydi. Elektron, pozitron yoki gamma to'lqinining spini bir xil elektromagnit to'lqin paketlari o'rtasidagi bog'lanishni, masalan, atom, proton yoki neytron bog'larini hosil qilishni anglatadi.

Kalit so'zlar: *elektron, pozitron, gamma to'lqinlari, atom, neytron, proton, atom, proton va neytron orbitallari, aylanish, hayajonlangan holat, elektronlarning tortilishi va itarilishi, transformatsiya nazariyasi, elektromagnit to'lqinlar va ularning orbitallarini o'zgartirish, kimyoviy, proton va neytron aloqalari, elektron formula.*

Аннотация. *Электроны и другие волны представляют собой пакеты электромагнитных волн (ЭМВП) или энергию, в зависимости от ситуации. Атомные, протонные и нейтронные орбитали при превращении образуют межатомные и межнуклонные связи. Согласно принципу минимума полной энергии, электроны одной атомной орбитали в электромагнитном волновом пакете становятся сферическими, полусферическими и секторно-сферическими электронами, а направление молекулярной орбитали зависит от положения валентного электрона и является частью этого. Разработаны электронные формулы для элементов в покое и возбужденных состояниях атомов.*

Электромагнитный волновой пакет имеет заряд и спин, имеет замкнутую непрерывную, однородную, устойчивую, стационарную форму электромагнитной волны и делится на орбитали, находящиеся в одном состоянии на атомной орбитали или попарно в ячейке с противоположным спином, но ячейки на одной орбитали не могут перекрываться, то есть пересекаться или перекрываться. ЭМВП не имеет другой формы, например, гантели или эллипсоида.

Формирование атомных и молекулярных орбиталей происходит путем спаривания с изменениями электронных орбиталей посредством пакетов электромагнитных волн более высокого порядка. Поэтому в качестве новой теории мы предлагаем теорию изменения электромагнитных волн с объяснениями, а также эквивалентной химической связи из эквивалентных электронов. Химическая связь всегда уникальна и не может быть разделена на s- и p-связи. Спин электрона, позитрона или гамма-волны относится к связыванию *идентичных пакетов электромагнитных волн, например, к образованию атомных, протонных или нейтронных связей.*

Ключевые слова: *электронный, позитрон, гамма-волны, атом, нейтрон, протон, атом, протонные и нейтронные орбитали, вращение, возбужденное состояние, притяжение и отталкивание электронов, теория трансформации, изменение электромагнитных волн и их орбиталей, химический, протонные и нейтронные связи, электронная форма.*

Abstract. *An electron and other waves are an electromagnetic wave packet (EMWP) or energy depending on the state. Atomic, proton, and neutron orbitals, during transformation, form interatomic and internucleon bonds. Electrons of one atomic orbital are transformed into spherical, hemispherical, and sector-spherical electrons in an electromagnetic wave packet according to the principle of minimum total energy, and the direction of the molecular orbital depends on the state of the valence electron and is part of the atomic orbital. Electronic formulas for elements in a state of rest and an excited state have been developed.*

An electromagnetic wave packet has a charge and spin, which has a closed continuous, uniform, stable, stationary form of electromagnetic wave and is located in a stationary atomic orbital in a single state or in pairs in a cell with opposite spins, in which the orbitals are divided, but in one orbital, the cells cannot be arranged in layers, that is, to intersect or overlap. An EMWP does not have a different shape, for example, dumbbell-shaped or ellipsoidal.

The formation of atomic and molecular orbitals occurs through pairing with the transformation of electron orbitals by high-order electromagnetic wave packets. Therefore, we propose the ***theory of transformation of electromagnetic waves*** *as a new theory, with explanations, as well as the formation of equivalent chemical bonds from equivalent electrons. A chemical bond always has a single character and is not divided into σ- and π-bonds. The spin of an electron, positron or gamma wave means the formation of a bond between identical electromagnetic wave packets, such as the formation of an atomic, proton or neutron bond.*

Keywords: *electron, positron, gamma waves, atom, neutron, proton, atomic, proton and neutron orbitals, spin, excited state, attraction and repulsion of electrons, theory of transformation, transformation of electromagnetic waves and their orbitals, chemical, proton and neutron bonds, electronic formula.*

Introduction. The atom and nucleus have been studied extensively, and many characteristics of the atomic electron, nuclear proton and neutron have been determined. There is still no precise definition of an electron, positron, proton or neutron. Therefore, vague statements about electromagnetic waves make it possible for researchers to provide them as clouds and quarks in various forms, that is, in spherical, dumbbell-shaped forms, interacting through hybridization and a fractional number: 1/3 quarks with strings. Therefore, researchers can imagine them as intersecting, overlapping, and interacting in parts. Therefore, the determination of their physical and chemical properties according to the laws of chemistry and physics is relevant.

One article [1] states that the neutron and proton are derivatives of mass and an electromagnetic wave packet, thereby showing that in the world, there is a material elementary particle-mass-the world consists of an elementary particle-mass and an electromagnetic wave packet of various types, such as a photon, electron, positron, and gamma wave. There is a neutron in the nucleus, but how does the neutron work, and what is its nature? A neutron has a spin, as well as a free neutron lifetime, which is discussed in this article.

In turn, an EMWP with a left or right spiral thread is charged and can have a vector directed clockwise or counterclockwise, which is the spin and magnetic moment. This indicates chemical and physical binding properties. They also differ in size, amplitude, and wavelength; these characteristics depend on the state of the energy level, so there are concepts about EMWP compression, and they can be divided into highly compressed, moderately compressed and uncompressed wave packets. EMWPs can be located in a cell singly or in pairs with opposite spins, compensating for each other according to the Pauli principle.

If we take the theory of EMWPs as a basis, this is the way in which energy is transmitted and transformed across the world.

All laboratory confirmations define energy as a "particle". The EMWP has a different definition, that is, a "particle", which is determined experimentally and is a state of energy, during an experiment with different characteristics, lifetimes and stabilities of the EMWP, or a portion of the collapsing electromagnetic waves are registered within a time frame of 10^{-9}-10^{-5} s.

Consequently, the electron should be considered not as a material point and not as an electron cloud in space but as an electromagnetic wave having a spiral, closed, continuous, stable, stationary uniform configuration with more highly ordered electromagnetic waves.

This configuration can be considered a state of energy-a closed, uniform, uninterrupted, stable and stationary state-which, when moving, does not emit or absorb energy but maintains its stable state in motion unless exposed to external influences.

Thus, we can conclude that many scientists have the same idea about the structure of the electron, but in all cases, according to classical theory, the electron is associated with a certain material point that distinguishes electrons from each other by quantum numbers and spins. Additionally, the configuration of an electron in an atomic orbital is spherical, dumbbell-shaped, and involves several distorted ellipsoids [2].

At the same time, it is impossible to agree with some proposed forms of electrons in the atomic orbital. In the proposed configurations, first, the stationarity of the electron in the atomic orbital as an electromagnetic wave is violated, and second, the s-electron freely intersects with the –p, –d and –f electrons in the formation of atomic orbitals, and the p, d, and f electron configurations in one period of an atomic orbital overlap each other (Figure 1). All this cannot be explained by existing theories and hypotheses since electrons are electromagnetic waves.

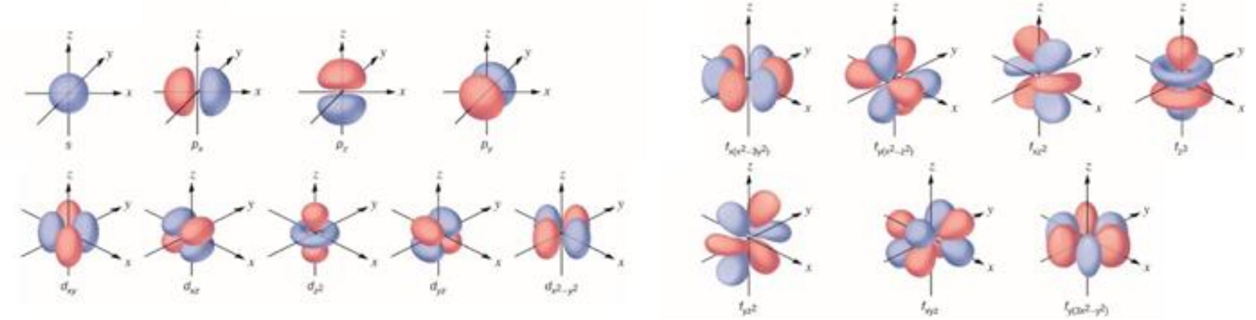


Figure 1. s, p, d, f electron configuration

There are no confinement conditions in an atom that prevent an electron from crossing and overlapping. In addition, if we consider the electron as a particle, then the question arises of how a "point or ball" can leave its stationary orbit in an atom and not destroy the equilibrium of the atomic orbital system. Is a stationary atomic orbital possible if there is a charge defect? Such questions of physics and chemistry are still left open, and in this article, we will try to answer them.

To date, chemists have openly ignored the dualistic nature of the electromagnetic wave of an electron. A clear example of this is hybridization, which is based on the concept of spherical, dumbbell-shaped and other complex forms of electrons formed during hybridization. If an electron is an electromagnetic wave, then what form can we even talk about, even if we assume the possibility of some kind of condensation of electromagnetic waves to certain forms, how is it possible for these waves to intersect and overlap in one period of the elements? These questions torment and perplex many minds.

The transformed toroidal electromagnetic field fills the entire space around the nucleus, and as in all rotating objects, an electromagnetic field appears in the void above the nucleus in a spherical configuration, which we can use for the configuration of an electron in the S-atom atomic orbital (Figure 2).

Figure 2. ($1S^1$) spherical electron

Figure 3. ($1S^2$) two spherical electrons with opposite spins

As seen from the theory, the outer electrons can be represented as spheres for the H, He, Li, and Be atoms. These configurations correspond to the unexcited state of the atom (Figure 3).

What happens during chemical reactions with atomic orbitals?

Now, we will consider the formation of chemical bonds in various molecules based on classical theory and the theory of transformation of electromagnetic wave packets.

Let us begin the formation of the simplest hydrogen molecule:

In the classical style, the reaction for the formation of a hydrogen molecule has the following form: the configuration of atomic and molecular orbitals (Figure 4).

Figure 4. Formation of a hydrogen molecule

If such an interaction with the formation of a hydrogen molecule with overlapping atomic orbitals is correct, then what part of the electron remains in the atomic orbital and what part of the electrons participates in the formation of a chemical bond in the molecular orbital (Figure 4 a); thus, the integrity of the chemical bonds is questionable. In regard to the molecular orbital, the electron orbitals are combined into a single molecular orbital, and the stationary orbital of the atom disappears (Figure 4 b) [3, p. 20]. However, this does not correspond to Bohr's law of stationary atomic orbitals because the electromagnetic wave of the electron is constantly in the stationary state of the atom orbital and during the formation of the molecular orbital.

We propose the following scheme for the transformation of EMWP to form a hydrogen molecule:

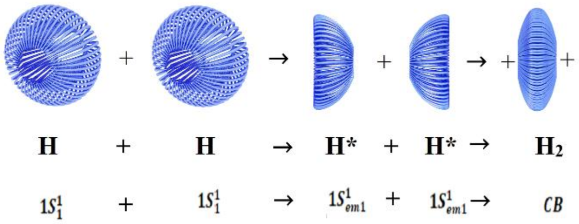


Figure 5. Scheme of the formation of a hydrogen molecule

When a chemical bond is formed, two spherical EMWPs of the hydrogen atomic orbital undergo a transformation, turning into hemispherical EMWPs and passing into an excited state (Figure 5). The two hemispheres form a flattened electron pair of covalent bonds. According to experimental data, the radius of the atomic orbital of hydrogen is 0.53 Å, and the internuclear distance of the hydrogen molecule is 0.74 Å; to explain the latter values using the classical method, it was necessary to introduce correction factors in the equation of quantum-chemical calculations since if there is an overlap of two electromagnetic waves of a spherical shape, the value of the distance between nuclei would be close to 1.06 Å (the sum of the radii of two electromagnetic waves) of the hydrogen atomic orbital [4].

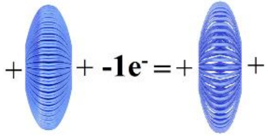
However, as we see, there is a decrease of 0.32 Å, which is in good agreement with the proposed theory of transformation of the atomic orbital EMWP, where the internuclear distance of molecular hydrogen is not the sum of the radii of two hydrogen atoms but rather the sum of the radii of two hemispherical transformed orbitals.

At the same time, the literature provides data that the distance between the nuclei of molecular hydrogen, equal to 1.06 Å, has a minimum energy, which corresponds to a stable form of the compound [5, p. 25].

This cannot be explained by classical methods but is easily consistent with our proposed theory of EMWP transformation. At the moment of formation of a bond between hydrogen atoms, two electromagnetic waves collide with the formation of an intermediate state, which will have a distance between the nuclei equal to the sum of the two electronic radii of the atomic orbital of hydrogen. However, as a result of the transformation, an energy of 50 kcal/mol is released, and the distance between the nuclei of molecular hydrogen decreases. The electromagnetic force of an atomic orbital, due to transformation in the configuration of two hemispheres, forms a flattened chemical bond, fully uniting two electromagnetic waves, which leads to the compaction of electromagnetic waves in the molecular orbital and a decrease in the internuclear distance.

As we can see from the above facts, the proposed theory of EMWP transformation better reflects the formation of a hydrogen molecule and even helps to explain some phenomena that were not explained by classical theories.

However, in chemistry, there is a phenomenon such as the molecular hydrogen cation, which cannot be explained by the method of valence orbitals. How can the formation of a molecular hydrogen cation be explained using the proposed theory of EMWP transformations? Consider the formation of a molecular orbital using H_2^+ as an example (Figure 6).

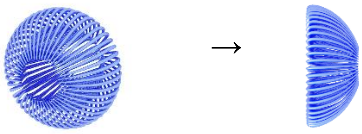


$$H_2 + -1e^- = H_2^+$$

Figure 6. Formation of the molecular orbital of hydrogen ions

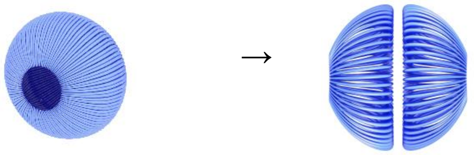
According to the literature, the radius of the hydrogen atom is 0.53 Å, the distance between the nuclei of molecular hydrogen is 0.74 Å, and the distance between the nuclei of the molecular hydrogen ion is 1.07 Å. Why does the distance between the nuclei of the molecular hydrogen ion increase because nothing that could affect the radius of the hydrogen atom was added there, but on the contrary, one electron was removed from the hydrogen molecule? Overall, when one electron leaves a hydrogen molecule, the remaining electron will be attracted by both nuclei, but at the same time, the nuclei will repel each other, i.e., if in a hydrogen molecule, two nuclei hold two electrons, then in an ion, they will be held by one electron. As a result, the distance between the nuclei of the molecular hydrogen ion stretches in space and reaches the sum of the radii of the hydrogen atoms, i.e., 0.53+0.53=1.06 Å [5, p.25]. Thus, one electron will be mutually stretched between two protons of the molecular hydrogen ion and will have the shape of a disk. Thus, the proposed theory easily explains this phenomenon, which classical theories fail to explain. Additionally, one electron between two nuclei retains its stationary orbital of the atom; each nucleus considers the electron to be its own, and one electron between two nuclei forms a chemical bond in the molecular hydrogen ion.

We consider the formation of a chemical bond in the Na_2He molecule due to the transformation of the outer valence electrons of the atoms.



Na^0, $3S^1$ → Na^*, $3Sem^1_1$

***Figure 7.* Transformation of sodium valence electron**

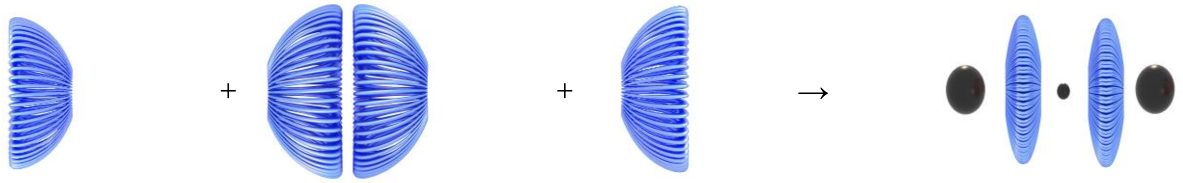


He^0 ,$1S^2$ → He^*, $1Sem^1_1$, $1sem^1_2$

***Figure 8.* Transformation of paired electrons of helium**

When excited with low atomic energy, sodium enters an excited state, and the atomic orbital is transformed into a hemispherical orbital of valence electrons (Figure 7).

When a helium atom is excited, spherical electron pairs transform into two transformed hemispherical atomic orbitals, and thereby, the resulting helium becomes divalent (Figure 8).

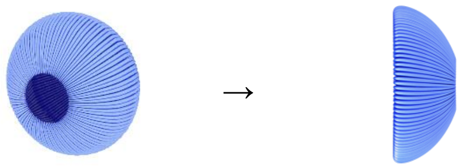


Na* + He* + Na* → Na He Na

Figure 9. Formation of Na_2He from transformed electron orbitals of Na and He atoms

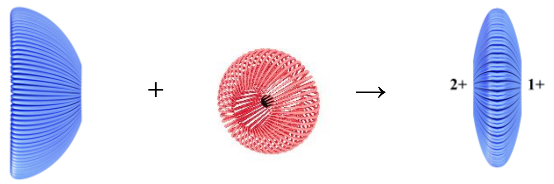
As shown in the figure, the valence electrons of sodium and helium, which have opposite spins, form a chemical bond with sodium helide (Figure 9). Both atoms consider electrons in chemical bonds to be their own, and the stationarity of atomic orbitals is not violated.

The HeH^+ compound is formed from the excited He^* transformer $1s^2{}_{em1}$ of helium; in this case, two electrons are transformed into one hemisphere (Figure 10).



He^0, $1S^2$ → He^*, $1s^2{}_{em1}$

Figure 10. Transformation of paired electrons of helium



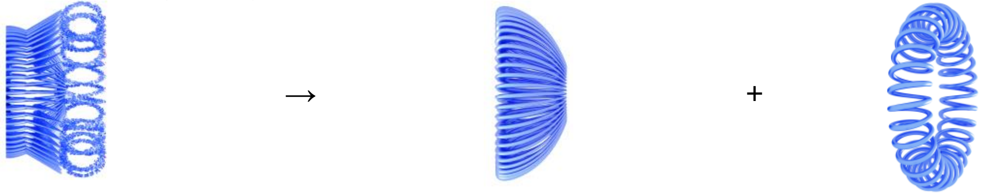
He^*, $1s^2{}_{em1}$ + H^+ → HeH^+

Figure 11. Formation of helium protonide

In this case, the He^* EMWP paired in a hemispherical transform forms a real chemical bond of the donor-acceptor type of helium as the donor $1s^2{}_{em1}$ and the hydrogen proton 1^+ as the acceptor. After the formation of a chemical bond, both atoms consider the paired electrons to be their own (Figure 11).

When the elements are in an excited state, the valence electrons (EMWPs) are transformed into hemispherical ones; sectoral-spherical electrons subsequently, upon receiving energy, transform into an excited state and resonate with the formation of light EMWPs of various frequencies and wavelengths.

The transformed EMWP of the hydrogen electron, which produces additional energy, resonates and forms an EMWP of light (Figure 12).



Excited resonating transformer EMWP of a hydrogen

Unexcited transformer EMWP of a hydrogen

EMWP of light

Figure 12. Formation of light EMWP from the valence electron of hydrogen

This production of light occurs in the sun and in other excited resonating states of atoms in LED, gas and incandescent lamps with various energy losses.

In the formation of a chemical bond between atoms of identical or different elements, the electronic theory of valence is currently used, according to which, when a chemical bond is formed between atoms, the valence electrons of the outer shell are paired.

Using the example of the classical method of the formation of the $BeCl_2$ molecule, two valence electrons of beryllium have different electronic configurations, 2 s^1 $2p^{1,}$ with two valence electrons of the second atom and forming two chemical bonds, which, logically, should have a different nature based on the difference in the bond formed from s,p-electrons. However, as practice shows, all bonds between the atoms of two elements $BeCl_2$ are identical in nature.

Is such an identical chemical bond possible and how can this be explained? The formation of identical bonds from the beryllium atomic orbitals of different types 2 s^1 $2p^1$ required the introduction of concepts such as hybridization (that is, "crossing") of atomic orbitals [2, page 600] (Figure 13) and (Figure 14).

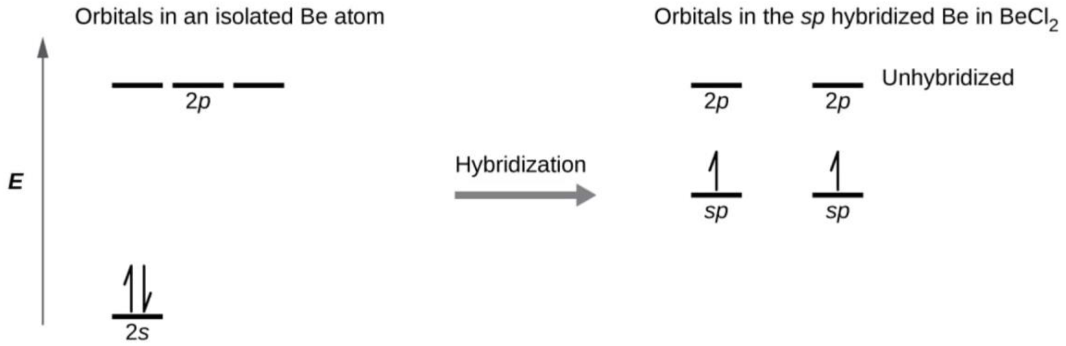


Figure 13. Orbital diagram of the beryllium atom

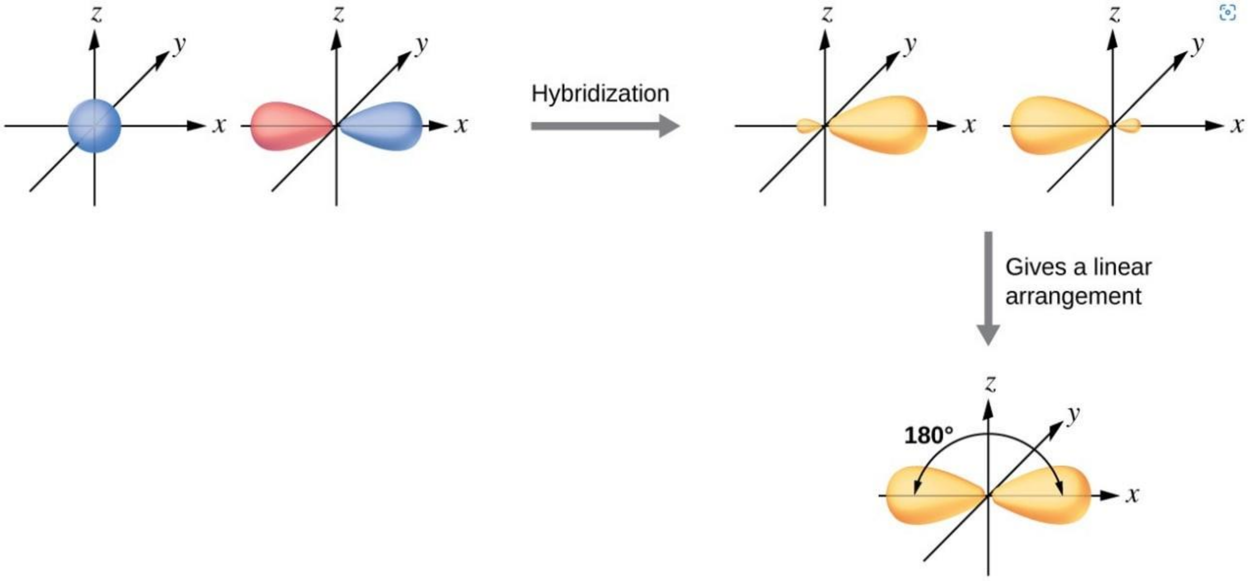


Figure 14. Scheme of electron hybridization in a beryllium atom

Here, a misunderstanding appears: how can one s-electron and ***p***-electrons form independent units-a hybrid orbital? The dumbbell-shaped electrons are divided into two parts, and the s electron merges with two half-electrons to form one hybrid; this hybrid forms two asymmetrical sp-sp orbitals with a dumbbell-shaped configuration.

Is it possible for the existence of half an electron, as well as an asymmetrical hybrid configuration of the electron orbital? In this case, in the resulting dumbbell-shaped configuration, the formation of elongated electronic orbitals occurs, which in turn leads to the formation of two different energy ends of the hybrid configuration. One of these ends of the hybrid is closer to the nucleus, and the other is further away; this does not correspond to the statement that all hybrid electron orbitals are equivalent. Another question arises: is it a hybrid of a chemical bond or something else?

How do these dumbbell-shaped p atomic electron orbitals cross with the s electron orbital, and what happens between them when electrons cross? In theory, the electrons of the orbital are electromagnetic waves in a package and should not intersect. Even if we assume that they interbreed, then some chemical phenomena must occur, for example, the formation of the simplest chemical bond. Previously, I somehow came to terms with these conclusions when I taught students on this topic of hybridizations, avoided sharp corners, told them that a cloud is not part of something, it cannot have a specific shape, and everything that is said about the shape of valence electron clouds is relative concepts that can only be considered special cases. However, when we had to talk about the hybridization of electron clouds, it was impossible to ignore issues such as the division of electron orbitals into parts and the formation of nonsymmetric and nonstandard forms that would act as one whole, ignoring all the laws of physics that exist today. In the work of L. Pauling, the s electron is divided equally between four tetrahedral orbitals, which cannot be explained [5, p. 93].

Based on the above, we see that in some cases, there are still ambiguities in explaining the nature of chemical bonds. The theory of hybridization operates mainly with respect to its ability to explain the formation of a chemical bond, which includes concepts such as π-bonding, hybridization, and separation of electrons into different configurations.

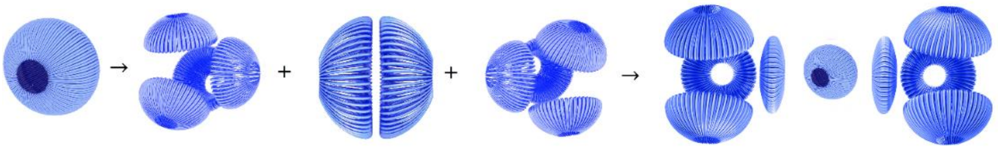
Therefore, the theory of transformation of electromagnetic wave packets is proposed as a new explanation for the formation of equivalent chemical bonds from equivalent electromagnetic wave packets of atomic orbitals.

Now, we will try to explain the formation of compounds based on the proposed theory without using hybridization.

Let us start with the formation of beryllium chloride. Here, during the reaction of beryllium with chlorine, the valence electron of the beryllium atom transitions to an excited state (Figure 15), in which two spherical electrons of beryllium $2s^2$ are transformed into two hemispherical orbitals and completely separate the space of the electromagnetic field, which are located at an angle of 180° and form a two-valence electromagnetic wave packet.

Be^0 (…$2s^2$) **Be* (…$2s^1_{em1}, 2s^1_{em2}$)**

Figure 15. Transformation of electromagnetic orbitals of beryllium into two hemispherical electromagnetic wave packets

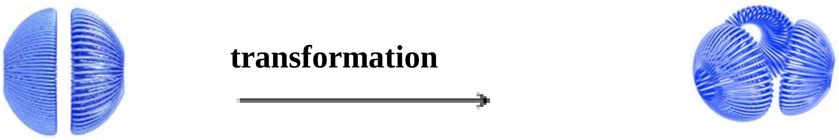


$Be^0 \rightarrow Cl^0 + Be^* + Cl^0 \rightarrow Cl — Be — Cl$

Figure 16. Schematic configuration of the formation of a beryllium chloride molecule

At the same time, in the chlorine atom, there are 7 electrons in the outer electron layer, which form 3 pairs, and the valence electron is in an unpaired state. During chemical reactions, the excited, transformed two hemispherical unpaired electrons of beryllium mutually overlap with one valence electron of two chlorine atoms, and two paired equivalent transformed electron pairs are formed; this is a covalent chemical bond. Thus, a beryllium chloride molecule with two identical bonds is formed, this mechanism of molecule formation does not require hybridization, and the stationarity of electronic orbitals in a chemical bond is not disrupted (Figure 16).

Formation of boron fluoride. In a hemispherical boron atom, two electrons form an electron pair, one electron is in an unpaired state, and boron in an unexcited state is monovalent. The interaction energy excites the outer electrons of boron, and the transformation of electromagnetic waves occurs. The paired two electrons are divided into a sectoral-spherical single EMWP; therefore, boron becomes trivalent (Figure 17).



B^0 (…$2s^2_{em1}2s^1_{em2}$) **B* (...$2s^1_{ec1}, 2s^1_{ec2}, 2s^1_{ec3}$)**

Figure 17. Transformation of the electron orbitals of the boron atom

In this case, each EMWP occupies 1/3 of the sector sphere and is located at an angle of 120°, which ensures that the valence electrons are equally distant from each other.

The three chemical bonds of the boron atom between the electrons of the reacting fluorine atom, as indicated above, are equivalent; hence, we see that the process of formation of a boron fluoride molecule also does not require the use of the theory of hybridization in the formation of a chemical bond (Figure 18).

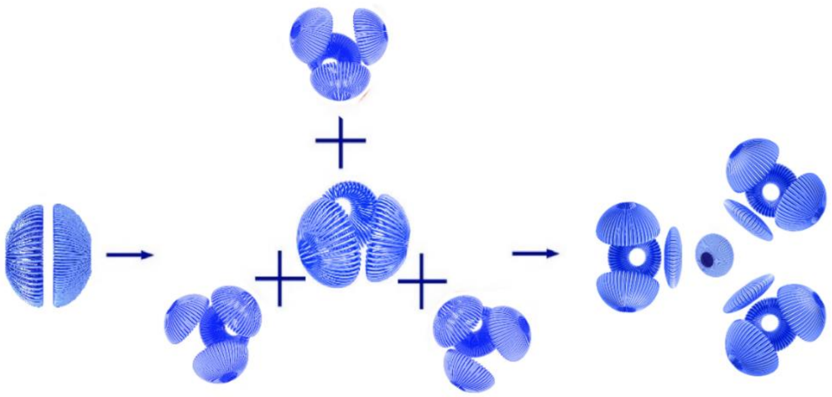


Figure 18. Electronic configuration diagram of the formation of a boron fluoride molecule

In the above reaction, when three EMWP-transformed boron valence electrons interact with the unpaired valence electrons of three fluorine atoms, they overlap each other, and three paired electron pairs of a covalent chemical bond are formed.

In the unexcited state in the carbon atom, in the outer layer of the atomic orbital, there are three cells, in which 1/3 of the sector-sphere is occupied by one pair of paired electrons, lagging, and two-thirds of the sector-sphere, in turn, are located with one electron each, thereby making the carbon divalent.

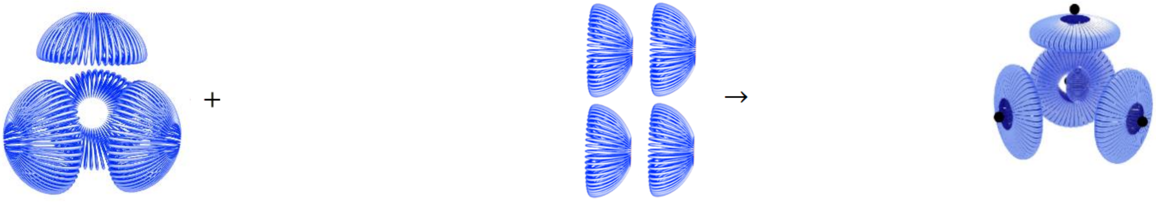
When a carbon atom is exposed to some energy, it leads to excitation of the atom and transformation of the EMWP of the outer layer of electrons, and as a result of excitation, the sphere of the carbon atomic orbital is divided into four parts; therefore, they are located relative to each other in space at an angle of 109°28'. On these parts of the sphere, the EMWPs of the electron are located singly and form a tetrahedral structure; therefore, the electrons are equidistant from each other (Figure 19).

$C^0 \ldots 2s^2_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}$ **C*…**$2s^1_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}2s^1_{ec4}$

tetrahedron

Figure 19. Transformation of the electromagnetic orbitals of the carbon atom upon excitation

Therefore, the formation of methane can be represented as follows (Figure 20).



C* $2s^1_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}2s^1_{ec4}$ **4 H*** $1s^1_{em1}$ → **CH₄**

tetrahedron

Figure 20. Electronic configuration of the formed methane molecule

The hybridization of electronic orbitals is a hypothetical process involving the displacement of different (s, p, d, f) orbitals of the central atom of a polyatomic molecule with the formation of identical orbitals, equivalent in their configurations. The angles between the hybrid orbitals are equal for sp^3 hybridization - 109.5^0, for sp^2 hybridization - 120, and for sp hybridization - 180^0.

The ideas about hybridization occupy a central place in the method of valence bonds, which makes it possible to explain the structure of molecules, in particular, the hypothetical modifications of atomic orbitals during the formation of a covalent chemical bond, in particular, the alignment of the lengths of chemical bonds and bond angles in the molecule; hybridization itself is not a real physical process but only a convenient model. Currently used mainly for methodological purposes and in synthetic organic chemistry.

The concept of hybridization was successfully applied to the qualitative description of simple molecules but was later extended to more complex ones; for example, it is not able to predict the photoelectron spectra of even simple molecules such as water. In 1958, L. Pauling developed the theory of a curved chemical bond, taking into account the Coulomb repulsion of electrons. According to this theory, a double bond was described as a combination of two bent chemical bonds, and a triple bond was described as a combination of three bent chemical bonds [5, pp. 7-16].

The double bond is explained in the textbook on organic chemistry by P. L. Bruce as follows [3].

The carbon atoms in ethylene form two bonds with each other, which is called a double bond. The two carbon atoms *do not have identical double bonds*. *One of the bonds that results from the overlapping* sp^2 orbitals of each carbon is called a sigma (σ) bond because it is formed by overlapping the large ends of the hybrid orbital. Each carbon uses its other two sp^2 orbitals to overlap with the hydrogen s orbitals to form C-H bonds. The second carbon–carbon bond occurs as a result of the perpendicular overlap of two nonhybridized p-orbitals. Lateral overlap of p orbitals results in the formation of π bonds. Thus, one of the bonds is a σ bond, and the other is a π bond. All C-H bonds are σ-bonds [3.p.30] (Figure 21).

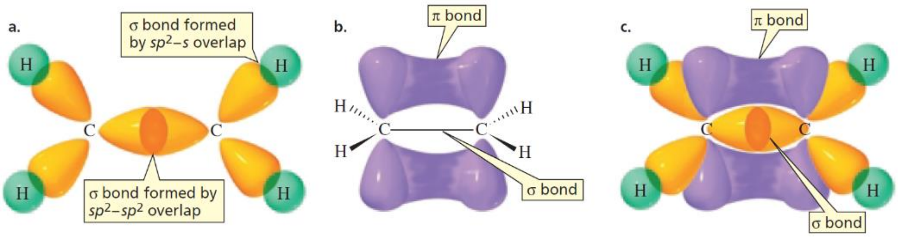


Figure 21. Formation of a double bond according to the concept of hybridization

The question arises of how two pairs of *p*-electrons can form a single chemical bond; if this is so, then why is the bond considered double because, in fact, two π-bonds and one σ-bond are formed between the hybrid electrons; thus, the bond here is triple. However, another problem (Figure 21) is that the σ-bond is located in the plane of the π-bond, but how can this be understood?

A reasonable question arises: how to explain the formation of a π-bond in a molecule, if we assume the existence of a π-bond and its formation from two p-electrons, then each part of the dumbbell, when overlapping, would form two single bonds; as a result, *p* orbitals were formed between two carbon atoms when overlapping would be a triple bond, and in acetylene, the number of bonds between two carbon atoms would be five.

According to the theory of transformation of electron orbitals, there are no bonds of different natures, and paired electrons form only the same bond. Placing two single bonds next to each other increases the antibonding effect of the bond and causes them to repel each other, making them more reactive than a single bond placed in isolation. Therefore, the chemical reaction of substances to a double bond leads to the breaking of one of the single bonds. Since the state of the connections cannot be observed directly during the reaction, the researcher has a false idea about the activity of one of these connections; in fact, both connections are equivalent, and any of these connections can interact (Figure 22).

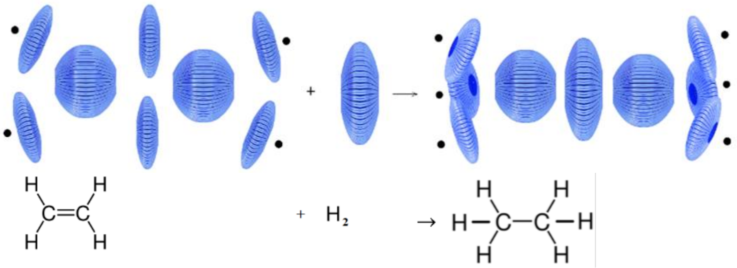


Figure 22. Electronic configuration for the formation of ethane from ethylene

The given example shows that the proposed theory of transformation of EMWP easily explains even some problematic issues, as in the case of ethylene, excess energy accumulates, which leads to an increase in the reactivity of the double bond.

According to our theory, the outer valence electrons can be represented as spheres (H, He, Li, and Be):

The electronic formula of a spherical atomic orbital

Spherical electronic formula

$$\boldsymbol{NS^n}$$

N - period number
S - spherical electron
n - is the number of electrons

With three hemispherical electrons (B):

Hemispherical electronic formula

$$NS^n_{em_s}$$

N - period number
S

N - period number
$\mathbf{S_{em}}$ - hemispherical electron
n - the number of electrons
s - sector number

An increase in the number of electrons in the outer layer (C, N, O, F, and Ne) leads to a sector-spherical form of electrons:

Sectorial-spherical electronic formula

$$NS^n_{ec_s}$$

N - period number
$\mathbf{S_{ec}}$-sectorial-spherical electron
n - is the number of electrons
s - sector number.

Disc-shaped covalent chemical bonds:

C.B. - covalent chemical bond

CB – Covalent paired electron in the form of a flattened disk in the formation of a chemical bond.

Based on the above, it is possible to write the electronic formulas of elements in the rest and excited states from the transformation of external electrons in the atom (Table 1).

The electronic formula of elements at rest and the transformation of electrons in the excited state of the atom

Table 1.

Electronic formulas of elements in the unexcited state and the transformation of external electrons into the excited state of atoms

№	**Name of the element**	**Electronic formulas of elements** ***Transformation of outer electrons in an excited state*
1.	Hydrogen	$1s^1$; $*1s^1_{em1}\ 1s^0_{em2}$
2.	Helium	$1s^2$; $*1s^1_{em1}1s^1_{em2}$; $**1s^2_{em1}1s^0_{em2}$
3.	Lithium	$1s^2\ 2s^1$; $*2\ s^1_{em1}2s^0_{em2}$; $**2s^1_{ec1}\ 2s^0_{ec2}\ 2s^0_{ec3}\ 2s^0_{ec4}$
4.	Beryllium	$1s^2\ 2s^2$; $*\ 2s^1_{em1}\ 2s^1_{em2}$; $***2s^1_{ec1}\ 2s^1_{ec2}\ 2s^0_{ec3}2s^0_{ec4}$

5.	Boron	$1s^2\ 2s^2_{em1}\ 2s^1_{em2}$; * $2s^1_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}$;**$2s^1_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}2s^0_{ec4}$
6.	Carbon	$1s^2\ 2s^2_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}$; *$2s^1_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}2s^1_{ec4}$
7.	Nitrogen	$1s^2\ 2s^2_{ec1}\ 2s^1_{ec2}\ 2s^1_{ec3}\ 2s^1_{ec4}$
8.	Oxygen	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^1_{ec3}\ 2s^1_{ec4}$
9.	Fluorine	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^1_{ec4}$
10.	Neon	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}$
11.	Sodium	$1s^2 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}\ 3s^1$; *$3s^1_{em1}\ 3s^0_{em2}$; **$3s^1_{ec1}3s^0_{ec2}3s^0_{ec3}3s^0_{ec4}$
12.	Magnesium	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}\ 3s^2$; *$3s^1{}_{em1}\ 3s^1_{em2}$; **$3s^1_{ec1}3s^1_{ec2}3s^0_{ec3}3s^0_{ec4}$
13.	Aluminum	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}\ 3s^2{}_{em1}\ 3s^1_{em2}$; *$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}$; **$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^0_{ec4}$; ***$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^0_{ec4}3s^0_{ec5}$; ****$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^0_{ec4}3s^0_{ec5}3s^0_{ec6}$
14.	Silicone	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}\ 3s^2_{ec1}3s^1_{ec2}3s^1_{ec3}$; *$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}$; **$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^0_{ec5}$; ***$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^0_{ec5}3s^0_{ec6}$ ****$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^0_{ec5}3s^0_{ec6}3s^0_{ec7}$; *****$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^0_{ec5}3s^0_{ec6}3s^0_{ec7}3s^0_{ec8}$
15.	Phosphorus	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}\ 3s^2_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}$; *$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}$ **$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^0_{ec6}$; ***$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^0_{ec6}3s^0_{ec7}$
16.	Sulphur	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}\ 3s^2_{ec1}3s^2_{ec2}3s^1_{ec3}3s^1_{ec4}$; *$3s^2_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}$ **$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^1_{ec6}$; ***$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^1_{ec6}3s^0_{ec7}$
17.	Chlorine	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}\ 3s^2_{ec1}3s^2_{ec2}3s^2_{ec3}3s^1_{ec4}$; *$3s^2_{ec1}3s^2_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}$ **$3s^2_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^1_{ec6}$; ***$3s^1_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^1_{ec6}3s^1_{ec7}$
18.	Argon	$1s^2\ 2s^2_{ec1}\ 2s^2_{ec2}\ 2s^2_{ec3}\ 2s^2_{ec4}3s^2_{ec1}3s^2_{ec2}3s^2_{ec3}3s^2_{ec4}$; *$3s^2_{ec1}3s^2_{ec2}3s^2_{ec3}3s^1_{ec4}3s^1_{ec5}$ **$3s^2_{ec1}3s^2_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^1_{ec6}$; ***$3s^2_{ec1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^1_{ec6}3s^1_{ec7}$ ****$3s^1_{c1}3s^1_{ec2}3s^1_{ec3}3s^1_{ec4}3s^1_{ec5}3s^1_{ec6}3s^1_{ec7}3s^1_{ec8}$

In the given diagrams of the configurations of the valence layer of elements of the first and second periods, the electrons located in the orbital occupy the entire space of the orbital. In hydrogen, the orbital is filled with one spherical electron emp; in the helium atom, the orbital is filled with the electron emp of a pair of electrons.

During the transition to the second period, the valence layer for lithium and beryllium repeats the electronic structure of hydrogen and helium, but we must remember that for these periods, the possibility of forming cells for the arrangement of electrons is up to four. We can observe such a division of cells for the valence layer of boron; here, two cells are formed, each of which occupies half of the sphere. One cell contains a pair of electrons, and the other half contains an unpaired boron electron.

There are three cells in the outer layer of the carbon atom: one cell contains paired electrons, and the other two cells contain unpaired electrons. In the nitrogen atom, the orbital is divided into 4 parts and has paired electron pairs in one part. This pair leads to a slight repulsion of the remaining electrons, as a result of which the orbital is not divided into four equal parts. The bond angle between electrons is approximately 107°A.

In the oxygen atom, the orbital is also divided into four cells, but unlike previous atoms, from the four cells, there are two paired pairs of electrons in the cell, the mutual repulsion of which reduces the bond angle. In the case of water, it is equal to 104.3°A.

As seen from the above data, the proposed theory of transformation of electron orbitals allows us to describe the formation of a chemical bond much better, and there is no need for crossing electrons of different types. At the same time, within the framework of this theory of transformation of electronic orbitals, some points were explained that existing theories could not explain and were classified as **special cases**.

The structure of the valence shells of the elements in the first and second periods is discussed above. What happens when so-called "d-electrons" appear? Absolutely nothing. Additional cells appear on the shell, on which these electrons begin to locate and rotate in their sectoral-spherical cell.

Some elements exhibit variable valences, which are associated with the transition of the element's atoms to an excited state. Let us consider the example of a chlorine atom and its transition to an excited state. Chlorine is in the third period of the periodic table of chemical elements D.I. Mendeleev and has 3 orbital layers that can be filled with electrons. According to the Pauli principle, the maximum number of electrons in the third period can be equal to $2\times3^2=18$. According to the third postulate of the proposed theory, the maximum number of cells in the third period is equal to half the maximum number of electrons, i.e., 18/2=9.

In the resting state (unexcited state), the third period in the outer electron layer of the chlorine orbital is divided into 4 cells, in which there are 3 pairs of paired electrons and 1 unpaired electron. During the transition to an excited state, electrons are isolated, and a new cell is formed for unpaired electrons. Due to the gradually isolated electron pairs, chlorine can exhibit valences of 1, 3, 5 and 7 (Table 1).

The proposed theory perfectly explains the phenomena of classical chemistry, for which it was previously necessary to operate with different assumptions.

Elements with an initial atomic number are resistant to time, and elements with a higher atomic number begin to have radioactive properties and are called radioactive elements. For example, during the β-decay reaction, Ni^{60} nickel is formed from Co^{60} cobalt [6], and the reaction is written as follows: $^{60}_{27}Co \rightarrow ^{60}_{28}Ni + e^- + \bar{\nu}_e$

According to the laws of physics, this reaction cannot be explained by how an electron is released from a nuclear neutron. First, when there are 27 positive charges, what energy should an electron have to overcome such an attractive force? It is also difficult to imagine the emission of an electron through several electronic layers of an atom, which pushes the electron inward, which is why β- decay does not comply with the laws of physics. Second, according to the theory of quarks, there are two d quarks inside the neutron, and their charge is equal to $(-\frac{1}{3} \times 2)$, where does the $-\frac{1}{3}$ charge come from, which is missing in the neutron? According to our theory, in the nucleus, there are 16 connected pairs of neutrons and one unbound excitation neutron with excess energy, while the neutron orbital is transformed. (Figure 23).

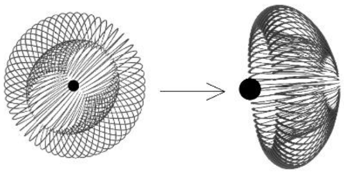


Figure 23. Transformation of the neutron gamma orbital

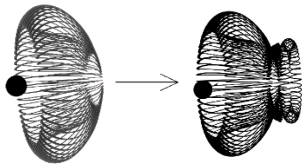


Figure 24. Resonance of a neutron gamma orbital upon excitation

The transformed neutron orbital resonates due to compressed energies (Figure 24).
A transformed excited single resonating neutron emits energy as a gamma EMWP (Figure 25).

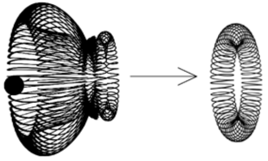


Figure 25. Emission of gamma-EMWP during resonance from transformed neutron orbitals

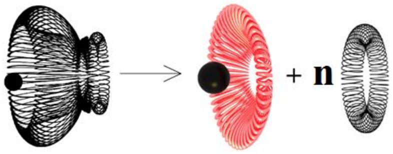


Figure 26. Formation of a proton orbital from a neutron orbital

Over time, the neutron EMWP emits an n-number of free gamma EMWPs of various energies and turns into a positive charge of the EMWP, thereby forming a proton from the neutron (Figure 26), and the total charge in the nucleus increases by one, which is logically explained by the theory of EMWP transformation.

Thus, all positive proton orbitals in the nucleus pair with opposite spins to form a proton bond. This makes it possible for protons and neutrons to accumulate through proton–proton and neutron–

neutron bonds in a small volume of the nucleus in the compression state of the electromagnetic field. This is not a β-decay phenomenon in the element cobalt.

Electromagnetic wave packets have spin-the vector of the direction of movement of the electromagnetic wave packet-electron, positron, and gamma waves-which determines the possibility of bond formation.

Thus, a hemispherical gamma orbital with the opposite spin forms a neutron bond (Figure 27).

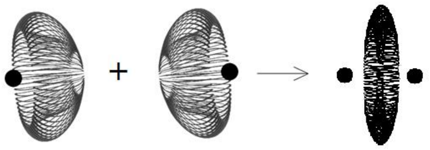


Figure 27. Formation of neutron bonds

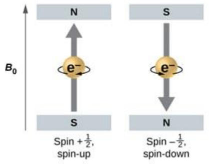


Figure 28. Electron spin according to classical theory

Electromagnetic waves have thus far been considered to be particle or electromagnetic waves; this statement is not true, as the particle disappears turning into electromagnetic waves, but it can be understood that energy has a calculated mass $E=mc^2$ but does not mean that it is a mass similar to a particle. Today's experiment with particles involves a certain electromagnetic wave in the reactor, and the entire measurement depends on the sensitivity of the electromagnetic wave scintillators.

The number of particles detected in the scintillator increases with increasing sensor sensitivity.

This is a measurement of 10^{-5} - 10^{-9} in seconds and what measures part of the damped waves, like let us say +1/3 u-quark, -1/3 d-quark, these are not particles.

In the future, with increasing sensor sensitivity, 1/4 may be possible; 1/5, 1/10, or "particles" of electromagnetic waves, but not particles, is about a mediocre measurement of destructible electromagnetic wave packets, which is accepted by researchers as a different type of particle; theorists represent the spin of an electron as a rotating point around its axis (Figure 28) [2, page.297], if clockwise +1/2 and counterclockwise -1/2 the spin of the electron, but this statement cannot explain the connection between electrons; that is, the spin is not only the direction of movement of the electromagnetic field but also the possibility of forming a connection between identical electromagnetic wave packets in atomic and nucleotide orbitals [1]. The electromagnetic force has a spin-this not only means the vector and direction of movement of the magnetic moment but also determines the properties of the formation of the bond of the electromagnetic force.

This means that the spin of electron, positron and gamma waves means the formation of a connection between identical electromagnetic wave packets, such as the formation of atomic, proton and neutron connections.

Based on the above information on the theory of EMWP transformation, the following postulates can be stated:

1. EMWP electron, positron and gamma wave pulse, which has a closed, continuous toroidal wavefunction in a uniformly, stable transformed configuration and is a more highly ordered electromagnetic wavefunction.

2. Electron, positron and gamma waves are located in the space of atomic, proton, and neutron orbitals. In one orbital, EMWP cells cannot be arranged in layers; they cannot intersect and overlap, have different configurations and are located singly or in pairs with opposite spins. The formation of atomic, nucleonic and molecular orbitals occurs through the pairing of electromagnetic waves with highly ordered EMWPs.

3. Spherical orbital proton and neutron EMWP are transformed, if necessary, into hemispherical orbitals with the formation of positive spins of proton and neutron orbitals with the subsequent formation of proton–proton and neutron-neutron bonds.

4. Electrons of one atomic orbital are transformed and tend to fill the entire orbital, evenly distributing space-spherical, hemispherical and sectoral-spherical EMWPs according to the principle of minimum total energy. The direction of the molecular orbital depends on the state of the valence electron and is part of the atomic orbital.

5. The nature of the pairing of electron pairs with opposite spins during the formation of atomic and molecular orbitals in a chemical bond does not differ (similar). A chemical bond always has a single character and is not divided into σ- and π-bonds.

6. The spins of electron, positron and gamma waves indicate the formation of connections between identical electromagnetic wave packets.

Based on the above knowledge, the following conclusions can be drawn:

1. The currently existing theories about the structure of atomic and nuclear orbitals and the nature of the formation of chemical bonds do not fully describe all cases; with the development of chemistry, an increasing number of special cases have appeared and are excluded from these theories.

2. Based on the proposed theory, the theory of hybridization is completely refuted, and the possibility of explaining the equivalence of chemical bonds formed by two atoms without the formation of hybrid clouds is proven; that is, the electron has a single configuration and properties.

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ЎЗБЕКИСТОН РЕСПУБЛИКАСИ ФАНЛАР АКАДЕМИЯСИ
МИНТАҚАВИЙ БЎЛИМИ
ХОРАЗМ МАЪМУН АКАДЕМИЯСИ

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