Reasoning Analysis of the Molecular Rearrangement and σ Key migration are False Appearances

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Abstract

Successful realization of nuclear magnetic resonance proves that hydrogen is a small magnet among the compound and its electron cloud is ring-shaped instead of ball-shaped, **it denies the possibility that spherical electron clouds overlap to form a covalent bonds. At the same time, it negates the existence of hybrid orbital.** Hybrid orbitals is a hypothesis, different electron orbital, their frequency is different, so, they can't be hybridized. On the other hand, if the electron s and p of the multi-electron atom are analyzed based on the principle of minimum repulsion, their electron clouds are also ring-shaped instead of ball-shaped or dumbbell-shaped. We called it electron wave ring or wave ring. The atomic wave ring structure can explain structure of methane, ethylene and acetylene perfectly, etc. By analyzing the atomic wave ring structure, it can be seen that basic principles of the conjugate dienes addition reaction, cyclization reaction, cyclization addition reaction, molecular rearrangement and σ key migration is the domino effect, this is an important chemical reaction rule. The molecular rearrangement and σ key migration are false appearances. This paper describes transfer process between single-bond and double-bond and proves existence of the atomic wave ring structure powerfully.

Key words: electron wave ring ring thimble domino effect

Introduction

It is a generally acknowledged that chemical theory is behind the practice. The hypothesis that electron clouds overlap into bond under theory of the organic chemistry breaches the principle of electron repulsion. So it cannot solve problems on organic molecular structure truly.

In daily life, we can catch a sight of one red ring when a red particle is in rapid circular motion. Therefore, when an individual electron spins round nucleus , since electron orbit keeps changing in angle and direction, accordingly, innumerable rings have come into being outside nucleus . In addition, since electron has wave feature, therefore, these rings keep changing in size and form. In a word, regardless of how many rings come into being and no matter how these rings change in size and form, they evolve from one ring. The dense area of intercrossing and overlapping of innumerable wave rings is electron cloud mentioned in modern chemistry, such as 1s ,2p ,3d electron cloud of hydrogen.

Success of NMR proves that hydrogen atom in compound is a small magnet; its extranuclear electron cloud is cycle other than sphere, in other word, a cyclic

electron flow is around hydrogen nucleus in compound. **Consequently, 1s, 2p, 3d electron cloud of hydrogen can only exist in isolated hydrogen atom. It denies the possibility that spherical electron clouds overlap to form a covalent bonds. At the same time, it negates the existence of hybrid orbital.**

Hybrid orbitals is a hypothesis, different electron orbital, their frequency is different, so, they can' t be hybridized. Electron cloud overlap bonding is also a kind of hypothesis, it goes against the electron repulsion principle, so, there is no such thing.

reasoning

How do electrons motion in multiple-electron atom? When individual electron on the same plane and same energy layer spins round nucleus, innumerable rings have come into being and these innumerable rings intercross and overlap to generate a compact electron ring, we refer to it as electron wave ring (EWR) or wave ring (WR). According to principle of least repulsion, when two electrons with the same energy level are in motion around nucleus on two mutual parallel and adjacent planes, from which the repulsion generated is the largest. When they are in motion around nucleus on two mutual perpendicular planes, from which the repulsion generated is the least. By consequence, the two electrons of helium atom are in motion around nucleus on two mutual perpendicular planes to generate two electron wave rings perpendicular and crossed with each other. In case of crossing of 3, 4, 5, 6, 7, 8 electron wave rings, in order to ensure equal repulsion between every two wave rings, the included angle between every two adjacent wave rings shall be 60^0, 45^0, 36^0, 30^0, 25.7^0, 22.5^0. (Fig 1, Fig2, Fig3)

Octet Rule of "Lewis Structure" has nothing to do with atomic diameter size, related to the Angle between the electronic wave ring. Here, also have disclosed the existence of atomic wave ring structure. In other words, the included angle between every two adjacent wave rings shall be no smaller than 22.5^0.

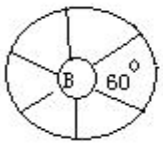


Fig 1

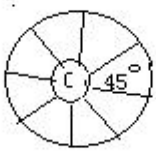


Fig 2

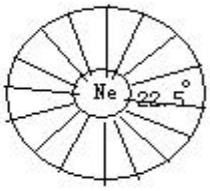


Fig 3

It is observed from the above mentioned analysis that the electron cloud in multiple-electron atom is also ring other than sphere and dumbbell in shape. Accordingly, the electron cloud in multiple-electron atom exists in the form of wave ring.

Reasoning 1. Two wave rings of helium atom are perpendicular and crossed with each other, its two cross points make up of two poles of helium atom, namely Z axis (Fig4):

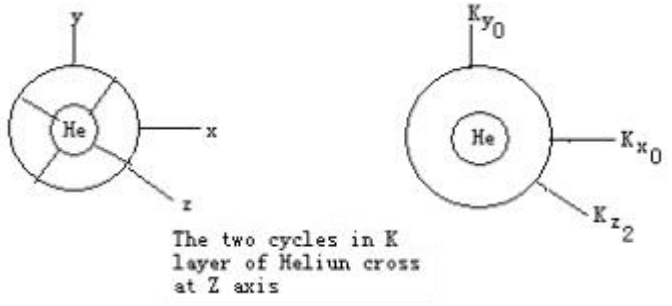


Fig 4

Reasoning 2. Regarding neon atom, the two wave rings in its inner layer are also perpendicular and crossed with each other, along having its two poles, the 8 wave rings in its outer layer also cross at two poles. It is observed from principle of least repulsion that it is impossible for the two poles of wave ring in inner layer to cross with two poles of wave ring in outer layer, supposing that two wave rings in inner layer cross at Z axis, then, 8 wave rings can only cross at X axis (Fig5):

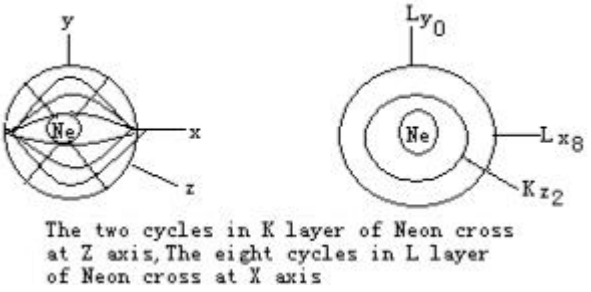


Fig 5

Reasoning 3. Argon atom is in third cycle, having an additional M layer, 8 wave rings in M layer can only cross at Y axis (Fig6):

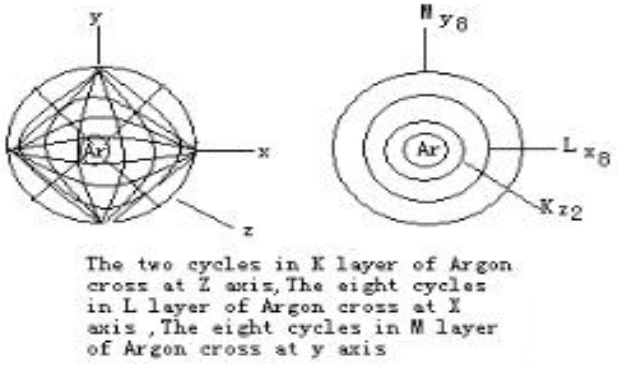


Fig 6

Reasoning 4. The basic law of extranuclear electron filling can be speculated based on crossing pattern of every wave ring of argon atom, namely there are two electrons filled in electron shell in Z axis at most, if previous main electron shell is fully filled in Z axis, then, next main electron shell shall start to be filled with electron from X axis, if X axis is fully filled with 8 electrons, then Y axis shall start to be filled with electron, if Z, X, Y axes are fully filled with electrons, Z axis shall start to be filled with electron again in such circle to enhance its reticulate electron shell layer by layer in succession, electron configurations in every axis in every cycle of chemical elements are given as follow:

(1) Cycle:Kz_2

(2) Cycle:Kz_2;Lx_8

(3) Cycle:Kz_2; Lx_8;My_8

(4) Cycle:Kz_2;Lx_8;$My_8.z_2.x_8$; Ny_8

(5) Cycle:Kz_2;Lx_8;$My_8.z_2.x_8$;$Ny_8.z_2.x_8$; Oy_8

(6) Cycle:Kz_2 ; Lx_8; $My_8.z_2.x_8$;$Ny_8.x_8.y_8.x_8$;$Oy_8.z_2.x_8$ Py_8

(7) Cycle:Kz_2;Lx_8;$My_8.z_2.x_8$;$Ny_8.x_8.y_8.x_8$;$Oy_8.x_8$ .y_8 .x_8 .$y_8.z_2$.$x_8Py_8.z_2.x_8$;Qy_8

Reasoning 5. Based on the sequence of electron number in the outmost layer of atom, electron number configurations in every axis in every cycle of chemical element are as follow:

(1) Cycle: K Layer Z axis: H1, He2

(2) Cycle: L layer X axis: Li1, Be2, B3, C4, N5, O6, F7, Ne8

(3) Cycle: M Layer Y axis: Na1,Mg2,AI3,Si4,P5, S6,CI7,Ar8

(4) Cycle: M layer Z axis: K1, Ca2

M Layer X axis: Sc1,Ti2,V3, Cr4, Mn5, Fe6, Co7, Ni8

N Layer Y axis: Cu1,Zn2, Ga3, Ge4, As5, Se6, Br7, Kr8

(5) Cycle: N Layer Z axis: Rb1, Sr2

N Layer X axis: Y1, Zr2, Nb3, Mo4, Te5, Ru6, Rh7, Pd8

O Layer Y axis: Ag1,Cd2, In3, Sn4, Sb5, Te6, I7, Xe8

(6) Cycle: N layer Z axis:(Lack)

N Layer X axis: (Cs1) (Cs2) Cs3, Ba4, La5, Ce6, Pr7, Nd8

O Layer Y axis: Pm1, Sm2, Eu3, Gd4,Tb5, Dy6, Ho7, Er8

O Layer Z axis: Tm1,Yb2

O Layer X axis: Lu1, Hf2, Ta3, W4, Re5, Os6, Ir7, Pt8

P Layer Y axis: Au1, Hg2, Tl3, Pb4, Bi5, Po6, At7, Rn8

(7) Cycle: O Layer Z axis:(Lack)

O Layer X axis:(Fr1) (Fr2) Fr3, Ra4, Ac5, Th6, Pa7, U8

O Layer Y axis: Np1, Pu2, Am3, Cm4, Bk5, Cf6, Es7, Fm8

O Layer Z axis: Md1, No2

O Layer X axis: Lr1, Ung2, Unp3, Unh4, Uns5,Umo6, Une7,Ds8

p Layer Y axis: Rg1, Cn2, Uut3, Uuq4, Uup5, Uuh6, Uus7, Uuo8

P Layer Z axis:(Lack 1-2)

P Layer X axis:(Lack 1-8)

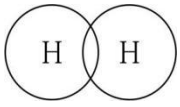
Q Layer Y axis:(Lack 1-8)

The seventh cycle lack of 18 elements, and are to be found or artificially synthesized.

In which, there are only 32 electrons in N layer in sixth and seventh periods, according to Octet Rule, only two X axes and two Y axes are available for arrangement, therefore, they lack of Z axis respectively, which properly demonstrate the true cause for reduction in diameter of lanthanide elements and actinide elements. It is observed from the above mentioned configurations that all periods end with 8 wave rings at X axis or Y axis except for Z axis in firth period. The number of elements in every period shows 2 ,8 ,8 ,18 ,18 ,32 ,50 in configuration, being the result of cyclic configuration in sequence of Z, X and Y axes.

Reasoning 6. It can be seen from above analysis that electron cloud of multi-electron atom is also ring-shaped instead of ball-shaped or dumbbell-shaped. That is to say, its electron also exists in the form of wave ring. As for bond of the covalent bond compound, firstly, taking hydrogen atom as example, when two atoms become a molecule, many wave rings interlock to form a stable molecular (i.e. ring thimble). After interlocking, movement scope of the wave ring is limited and electron cloud of hydrogen is not ball-shaped longer. If any ring does not move, the other ring only can move around it. In other words, the two wave ring phases interlock, movement possibility of wavering between two hemisphere shells is increased. However, it is different in nature with electron cloud overlaps the bond.

For easy description, we simply the rings into one ring, and the symbol “-R-” or “R-” is used to represent the wave ring and “R” is used to represent the element. Wave ring interlock (ring thimble) is represented by “×”, which refers to the covalent bond. The “R→” is used to represent the wave ring embed (ionic bond). Wave ring structure of the hydrogen molecule is shown as below(Fig7, Fig8):



H-X-H

H2 ring thimble

Fig7

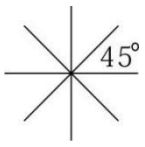
H2 molecular formula

Fig 8

Reasoning 7. Later, we will analyze tetrahedron structure of methane. Methane is interlocked by 1 carbon atom and 4 hydrogen atoms. We all know that there are 4 electrons in external layer of the carbon atom, called 4 electron wave rings. According to principles of repulsion balance among wave rings, 4 wave rings divide the carbon into 8 parts, and angle between neighbored wave ring is 45° . There are 4 wave rings, so the carbon atom cannot form tetrahedron structure.

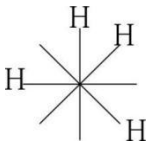
When the carbon atom and 4 hydrogen atoms realize interlock, the 4 hydrogen atoms shall keep equal distance in order to keep equal repulsion. On the other hand, distance between each hydrogen atom and the carbon core is equal. In other words, when the 4 carbon atomic wave rings interlocks with carbon atom, it shall keep equal distance among atoms and keep equal distance between each atom and carbon nuclear. In order to satisfy the such conditions, locking locations of them and the carbon atom are 4 peaks of the tetrahedron.

In below, we will give wave ring structure formula of carbon, methane and methyl alcohol and symbol “C” of carbon is omitted.(Fig9,Fig10,Fig11):



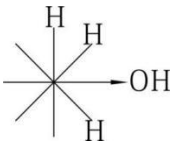
wave ring of carbon

Fig 9



methane molecular formula

Fig 10



methyl alcohol

Fig 11

Reasoning 8. In the crystalline state, the alkyl carbon chain is zigzag(Fig12):

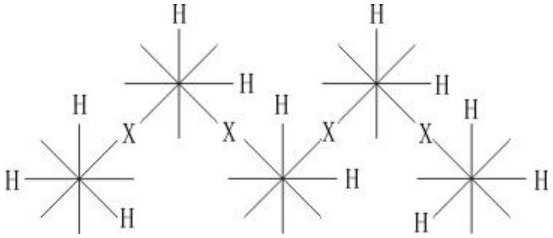


Fig 12

Reasoning 9. When a molecule is composed of the atoms as a result of chemical reaction, the angle and direction of the electron WR change more obviously.According to the rule that the included angle of every two neighbouring WRs is no less than 22.5^0,in an ethylene molecule, the electron WRs of carbon atoms interlock with each other with 22.5^0 included angle, forming a double bond. The other pair of WRs that interlock with hydrogen’s WRs changes its original angle and moves respectively towards both ends of the ethylene molecule in order to maintain the repelling power equal(Fig 13).

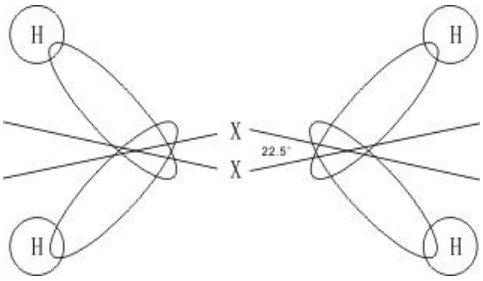


Fig 13

Seen from the above formula, in C=C double bond each pair of WRs interlock with each other with a 22.5^0 included angle, therefore, its bond length is shorter than C-C single bond.

Reasoning 10. In an acetylene molecule, 3 WRs of a carbon atom interlock with that of the other carbon atom, in the middle a WR interlocks in a straight line while on both sides the WRs interlock with one another at an included angle of 45^0 respectively. So, the bond length of C 三 C triple bond is even shorter. It has already been proved that C-C' s bond length is 0.154 nm in an ethane molecule; C=C' s bond length is 0.134 nm in an ethylene molecule; C 三 C' s bond length is 0.120 nm in an acetylene molecule. The WR formula gives a satisfactory explanation on the cause that the bond length shortens in a double bond and a triple bond.

In an acetylene molecule, no matter whether the WRs which interlock the hydrogen atom is above the molecular axis or below it, they can' t keep balance of the repelling power. So they need not only change the angles but also the directions, i.e. Along the molecular axis turn 90^0 towards both sides of the molecule in order to make the WR plane become vertical with the WR plane where 3 WRs interlock, and extends towards the sides of the molecule(Fig14).

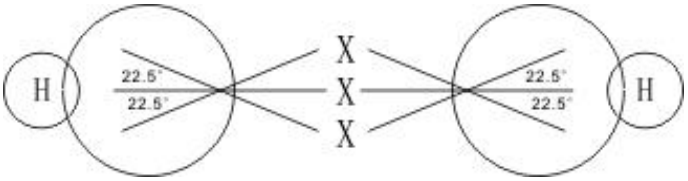
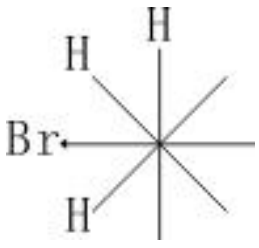


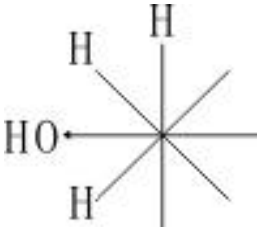
Fig 14

Reasoning 11. To discuss the nucleophilic substitution Sn2 process, first write down (-) bromomethane and methyl alcohol' s antipode, and their WRs reaction formula:



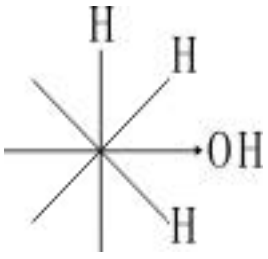
(-)bromomethane

Fig 15



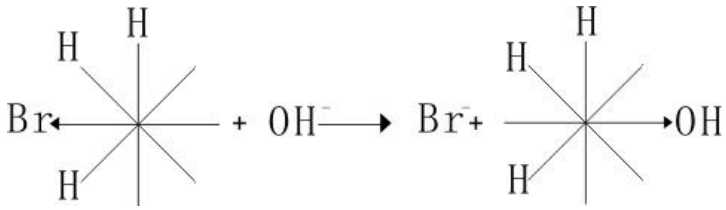
(一) methyl alcohol

Fig 16



(+) methyl alcohol

Fig 17



(—) bromomethane (+) methyl alcohol

Fig 18

When bromomethane hydrolyzes, the nucleophilic reagent OH- attacks from the right side, in the meantime Br- ion leaves from the left side, which agrees to the theoretical hypothesis of traditional chemistry. But its three hydrogen atoms need not invert (Fig15, Fig16, Fig17, Fig18).

Reasoning14. There are both WR interlock and WR embedment in some polyatomic molecules. For instance, in a sulfuric acid (H_2SO_4) molecule, two WRs of hydrogen atoms embed in two oxygen atoms respectively. Among the six WRs of sulfur, two pairs interlock with two oxygen atoms respectively, the other two embed in two oxygen atoms with hydrogen separately (Fig19):

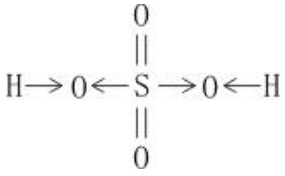


Fig 19

Reasoning15. Under varying circumstances, the WR embedment or interlock of the same atom may be transformed mutually. For example, in an ammonia molecule, 3 hydrogen's WRs embed in the outer layer of nitrogen atom. Nevertheless, in an ammonium chloride molecule, hydrogen's WRs transform from embedment into interlock (Fig20, Fig21):

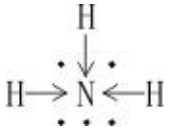


Fig 20

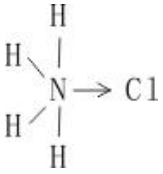


Fig 21

Verification

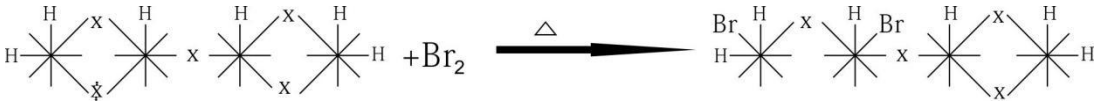
Later, we will analyze the conjugate dienes addition reaction, cyclization reaction, cyclization addition reaction, molecular rearrangement and σ key migration. It is found that their natures are the same, domino effect. The molecular rearrangement and σ key migration are false appearances. This strongly testify the existence of atomic wave ring structure.

Verification 1. Nature of conjugate dienes addition reaction is domino effect

In the wave ring structure below, the symbol "×" means covalent bond and "⋇" means the bond to be disconnected immediately.

In wave ring reaction formula of 1,3-butadiene, it can be seen that nature of the conjugate dienes addition reaction is a domino effect (Fig22, Fig23):

(a)



1,3-butadiene 3,4-dibromo-1-butene

Fig 22

(b)

1,3-butadiene 1,4-dibromo-2-butene

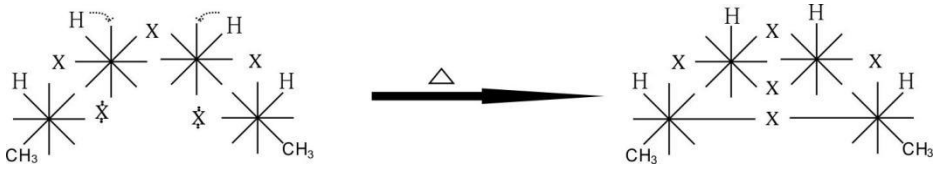
Fig 23

In formular (a), there is only one double-bond is disconnected to form the 3,4-dibromo-1-butene. What can be seen is (Br and C4) interlock → (C3 and C4 one-side double-bond) disconnection → (Br and C3) interlock, which is one phenomenon of domino effect.

In formular (b), the two double-bonds in the same side are disconnected to form the 1,4-dibromo-1-butene. What can be seen is (Br and C1) interlock → (C1 and C2 one-side double-bond) disconnection → (C2 and C3 forms double-bond) interlock → (C3 and C4 one-side double-bond) disconnection → (Br and C4) interlock, which is a domino effect.

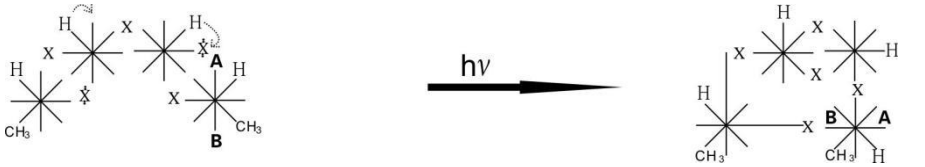
Verification 2. yclization reaction follows the domino effect

The example is as below(Fig24,Fig25):



{E,Z]-2,4-diallyl cis-3,4-dimethyl-cyclobutene

Fig 24



[E,Z]-2-4-diallyl trans-3,4-dimethyl-cyclobutene

Fig 25

{E,Z]-2,4-diallyl turns into cis-3,4-dimethyl-cyclobutene when it is heated; turns into trans-3,4 -dimethyl-cyclobutene when illuminated.

Seen from the above formula , when heated, each bond breaks at the same side of the two double bonds of [E,Z]-2,4-diallyl。Furthermore, it is also found that hydrogen of C2 and C3 migrates towards the neighbouring wave ring, which is beyond the description of the general chemical formula.Then the wave rings of C1 and C4 interlock to form a ring; While the wave ring of C2 and C3 interlock to form a double bond, as a result , cis-3,4-dimethyl-cyclobutene is composed.

When illuminated, two double bonds of [E,Z]-2,4-diallyl cross each other or each breaks one bond, i.e. The inner side bond of C1 and the outer side of C4 break respectively. Supposing C1 remains the still, first, rotates 90^0 clockwise to straighten the single bond between C3 and C4 ; Second, interlock B side of C4’s

disjointed wave ring A-B with C1 to form a cycle; In the meantime, hydrogen of C2 and C3 migrates towards the neighbouring wave ring, thus to link C2 and C3 into a double bond. In this way trans-3,4-dimethyl-cyclobutene is formed.

Because the frequency of light wave is fixed, it can only break off two electron WRs with the same frequency. In two double bonds, the WRs of the two double bonds on the opposite sides have the same frequency and direction. Therefore, each double bond breaks off one bond on the two opposite sides when illuminated.

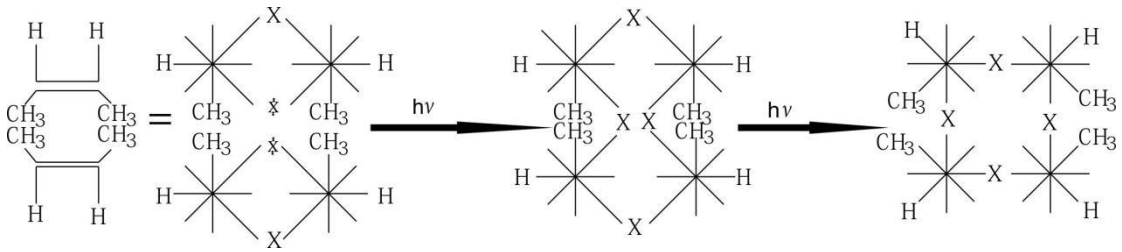
There is no difference of frequency and direction when heated, so each double bond breaks one on the same side. Consequently, the products of the two process have the cis-trans distinction.

what can be seen is “disconnection → interlock → disconnection → interlock” which is a domino effect.

Verification 3. [2+2] cyclization addition reaction follows the Domino effect

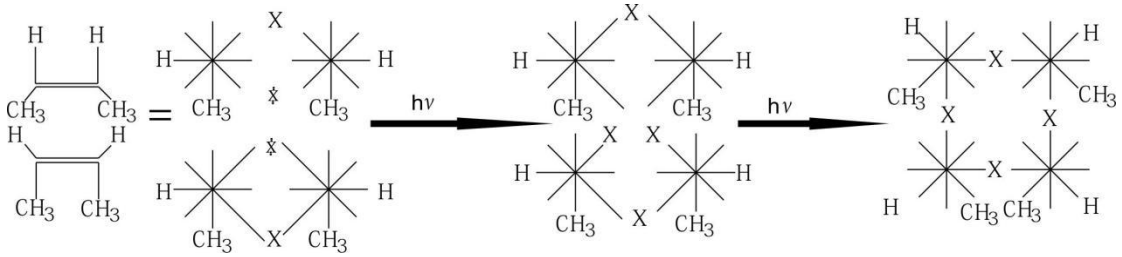
In a [2+2] cyclization addition reaction, two molecules may cyclization addition face to face (opposite double bond breaks) under the circumstances of illumination. However, the direction is face to back (the double bond breaks on the same side) under the circumstances of heating. Because the two disjointed cycles are isolated and the WRs’ angle differs obviously, so there is no addition reaction.

Such as, (Z)-2-butene’s two molecules add face to face when illuminated, producing two isomers of 1,2,3,4-tetramethyl-cyclobutane.you can see,that the double bonds disconnect → interlocking → disconnect → interlocking , which is a Domin0 effect(Fig26,Fig27):



(Z) -2-butene 1,2,3,4-tetramethyl-cyclobutane

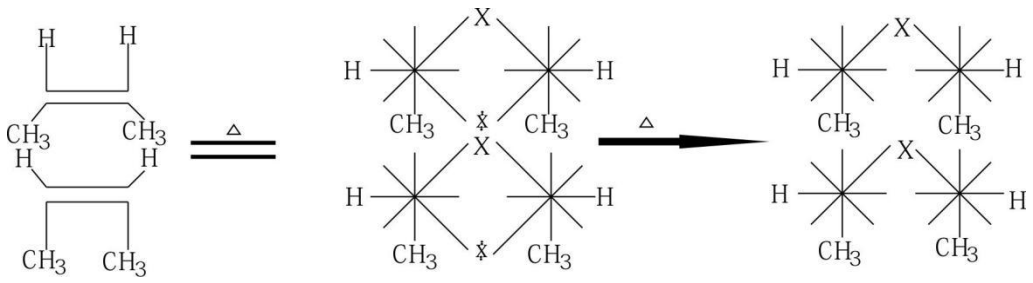
Fig 26



(AA)-2-butene 1,2,3,4-tetramethyl-Cyclobutane

Fig 27

When heated, the double bond on the same side (face to back) breaks because the disjointed WRs are isolated, they can’t link together as a ring(Fig28):



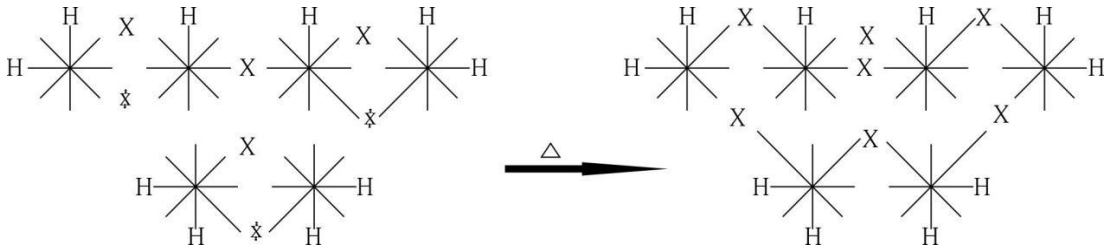
(Z) -2-butene

The disjointed WR are isolated

Fig 28

Verification 4. [4+2] cyclization addition reaction also follows the Domino effect For example, in a [4+2] cyclization addition reaction, the former break double bond on the same side when heated, and is allowed to cycloaddition the latter face -to - back. However, when illuminated, the former' s double bond on the opposite sides cross each other or break one bond respectively, and can' t cycloaddition face -to - face with the latter, because of the obvious wrong direction of disjointed wave rings, one bond of the double bond is disjointed and separated and can' t cycloaddition. For instance, 1,3- butadiene is allowed to cycloaddition ethylene when heated(Fig29,Fig30):

Fig 29

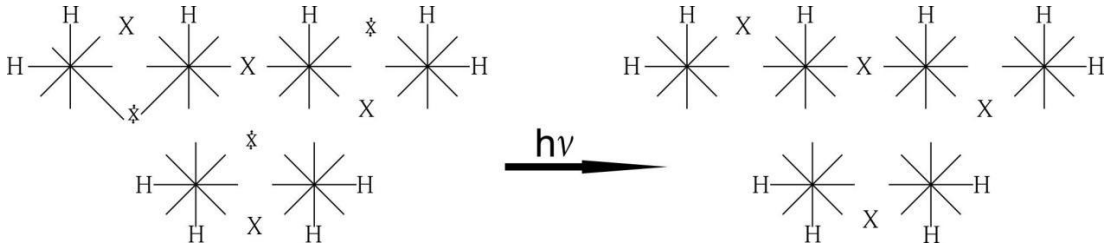


1,3-butadiene and ethylene cyclization (face-to-back)

Fig 30

As you can see, between six carbon atoms, disconnect →interlock→disconnect → interlock, which is a domino effect.

When illuminated, the disjointed WRs on one side of 1,3- butadiene is separated and can' t interlock ethylene face to face into a ring(Fig31):

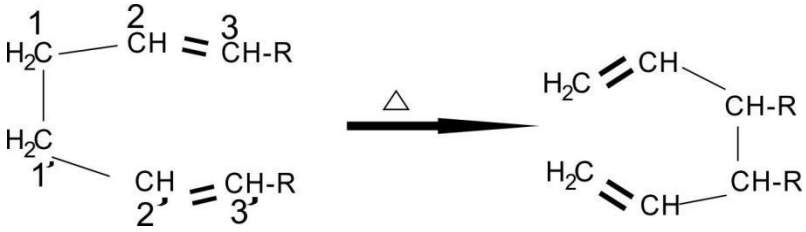


1,3-butadiene’s disjointed WR on one side are separated

Fig 31

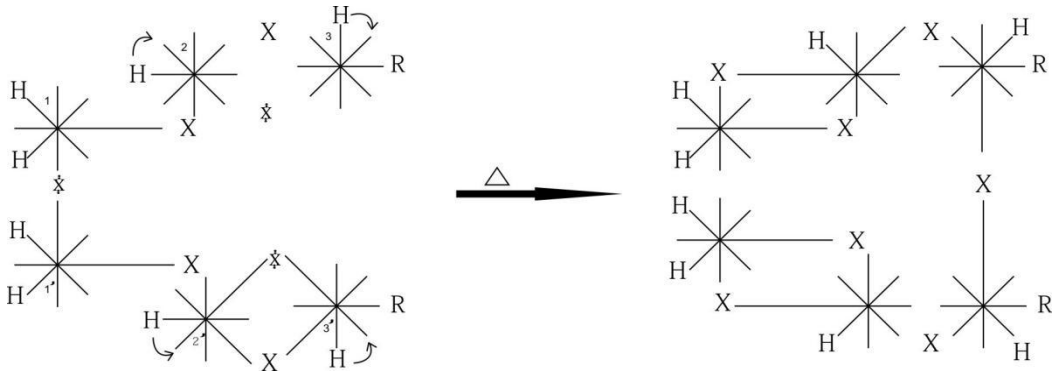
Verification 5. The Cope rearrangement follows the Domino effect

The Cope [3,3] σ bond migration is illusion, please see the following analyses(Fig32,Fig33):



Cope rearrangement

Fig 32



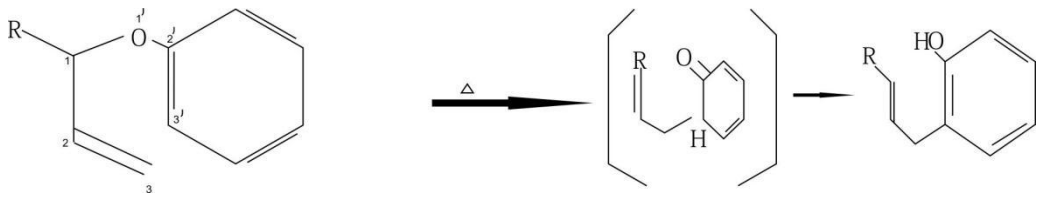
Cope Domino effect

Fig 33

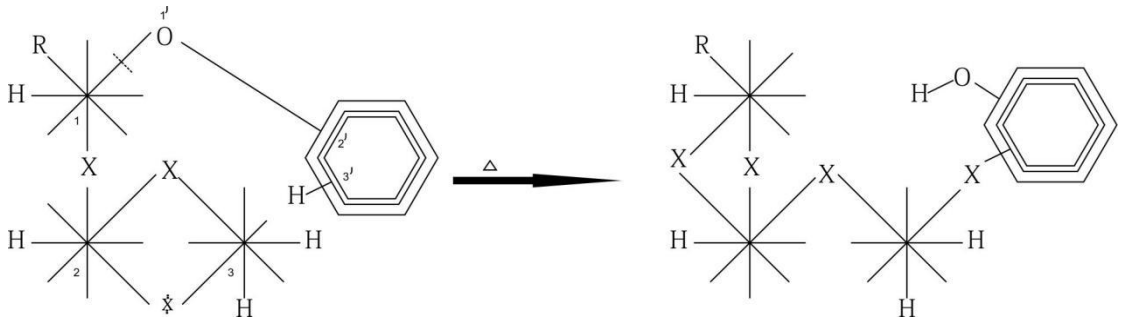
After C1-C1’ bond break off, H of C2 and C2’ migrates toward the neighbouring cycles, then forcing C3 and C3’ double bond break off respectively, at the same time H of C3 and C3’ migrates towards neighbouring WRs and C3 interlocks C3’ forming a bond . However, C2-C1 and C2’-C1’ form a double bond. The WRs from C1 to C3, from C1’ to C3’, break → interlock → break → interlock , which is a Domino effect(Fig 34,Fig 35).

Verification 6. The Claisen rearrangement follows the Domino effect

The Claisen [3,3]σ bond migration is illusion(Fig34):



Claisen rearrangement



Claisen Domino effect

Fig 34

After σ bond between C1 and O disconnect, one side of the broken WR of C1 interlocks C2, makes C2 and C3 double bond break off. However, the other side of the broken WR of C3 interlocks C3' and forces H in C3' migrates towards O, forming OH bond . However, OH and OC bond has changed from interlock to embedded. Hence, Claisen rearrangement also follow the rule " break → interlock → break → interlock" ,which is a Domino effect.

Verification 7. H attends [1,3] σ key migration is illusion, it follows the Domino effect(Fig35,Fig36):

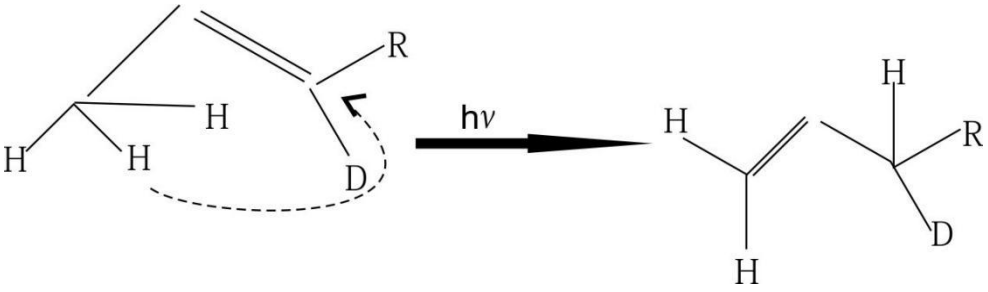


Fig 35

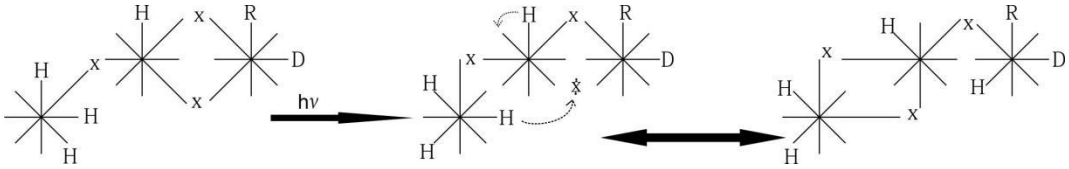


Fig 36

Verification 8. H attends [1,5] σ key migration is illusion, it follows the Domino effect(Fig37):

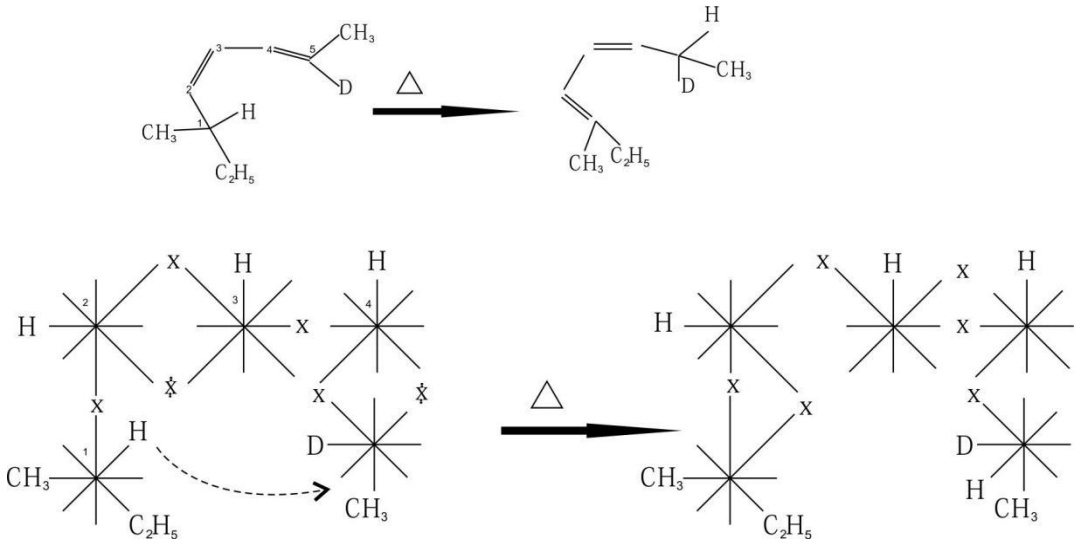


Fig 37

Verification 9. C attends [1,3] alkyl σ key migration is illusion, it follows the Domino effect(Fig38,Fig39):

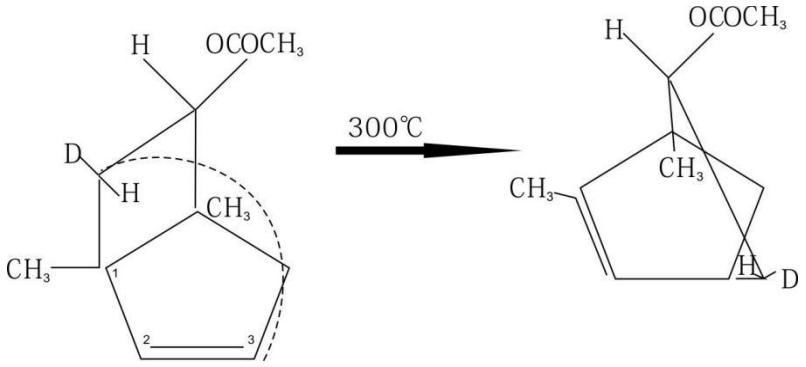


Fig 38

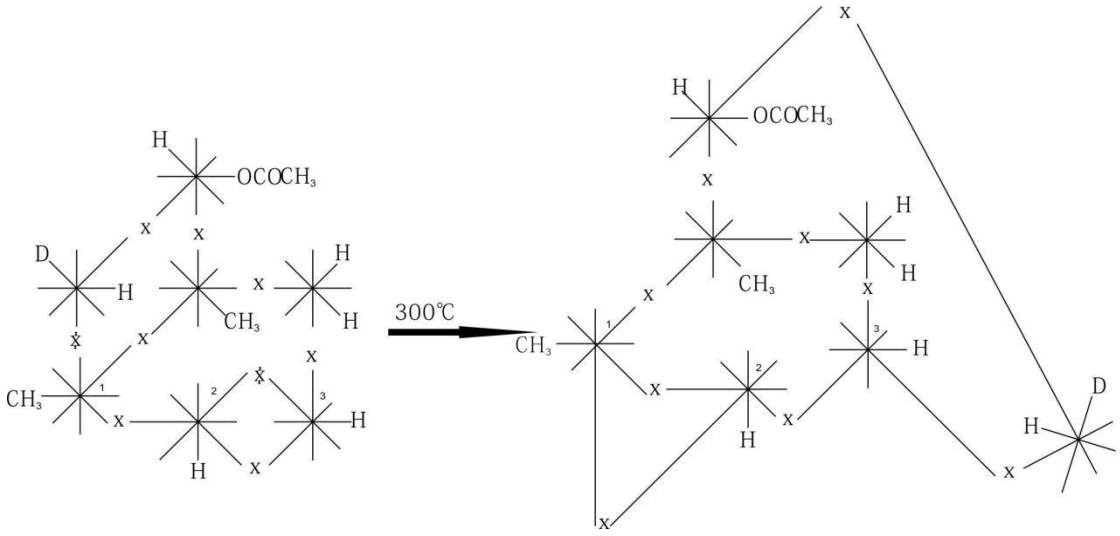


Fig 39

Verification 10. C attends [1,5] alkyl σ key migration is illusion, it follows the Domino effect (Fig40,Fig41):

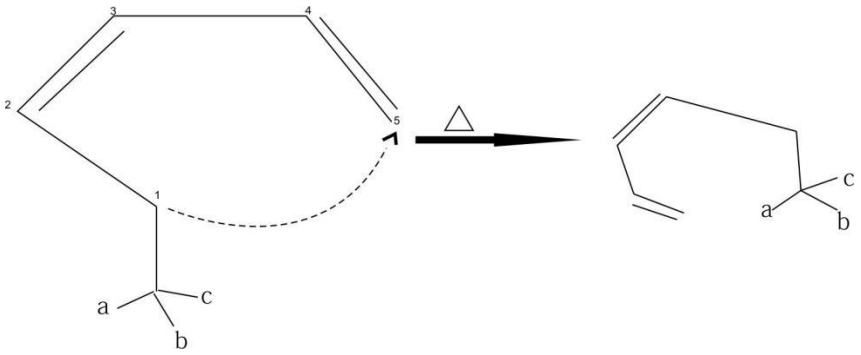


Fig 40

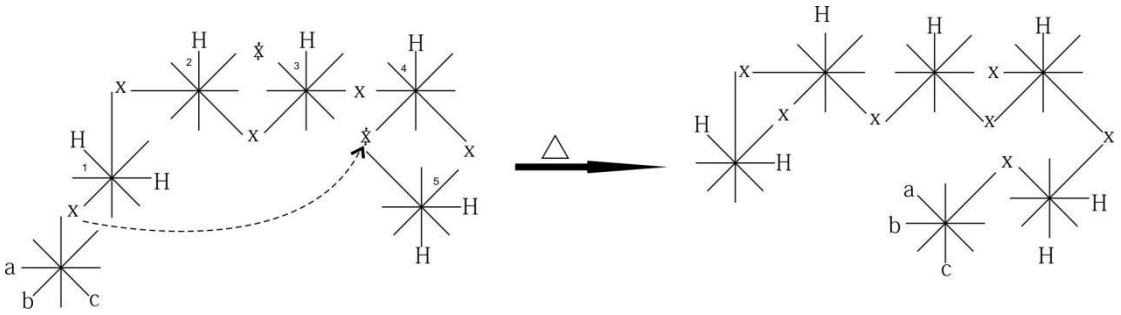


Fig 41

Conclusion

Based on above analysis, **we can get the conclusion that the principle of molecular rearrangement and σ key migration is a domino effect,to be sure, this is not a coincidence,but is the only correct explanation, there can be no second explanation,this is an important chemical reaction rule.**

This article is based on the nuclear magnetic resonance (NMR) and repulsion minimum principle, deduced the wave ring structure of the atom. prove that molecular rearrangement and σ key migration are false appearances.

Because the wave ring theory has scientific basis,Wave ring theory to reasonably explain all kinds of molecular structure and chemical reaction,is the best proof.Can be predicted,the eggs into the chicken,is a comprehensive,complex domino process.

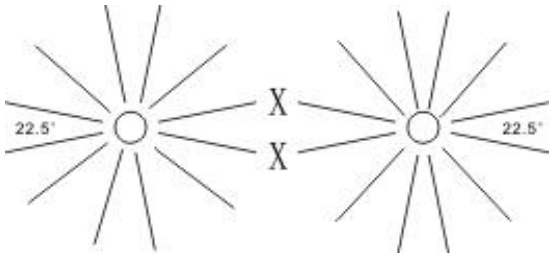
Reference

1, Wang Yun_wu editor in chief. Organic chemistry. Higher education press. August 1993. Second edition.

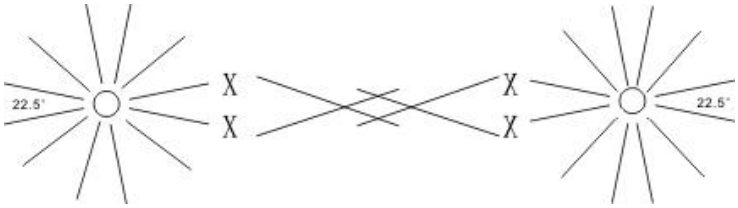
2,Mendeleev periodic table

Important supplement

{1} Below,write wave ring structure of O_2 and CO_2 .



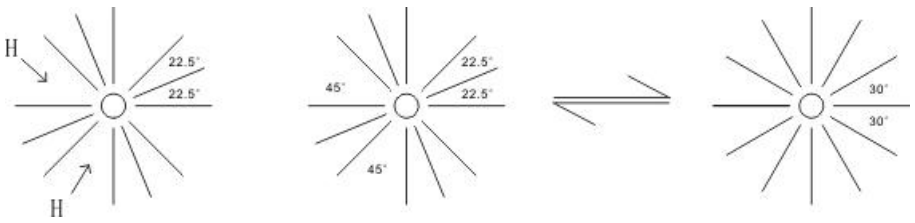
In O_2 two WRs interlock with a 22.5^0 included angle



In CO_2 two pairs of carbon WRs interlock with O WRs with 22.5^0 included angle

{2} In order to keep balance, the eight electron WRs in the outer layer of a neon atom must be equidistant from each other, because of electron repelling. Consequently, a neon atom's eight electron WRs divide evenly the outer spherical shell into sixteen parts, of which every two parts has a 22.5^0 included angle. It can be inferred that the arrangement rule of the WRs of each sub-layer in the same main electron shell is :the two WRs in the first sub-layer cross each other at right angles; the second, cross at the place where the two opposite angles divide the first sub-layer evenly into two parts; the third, cross at one pair of the eight oblique diagonal angles which are formed by dividing the first and second sub-layers; the fourth, cross at the place where the left pair of oblique diagonal angle is divided evenly.

H_2O molecule is formed by two hydrogen atom's WR embedding in the two larger included angles of the oxygen atom. So, it is not a straight line.



Water molecules wave ring structure

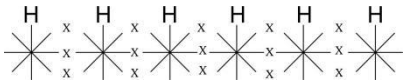
Three sub-layer repulsive force is Not equal

Three sub-layer repulsive force equal to the

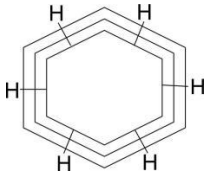
It is known that the included angle is 22.5^0 between every two neighbouring electron WRs in the outer layer of a neon atom, i.e. a WR outside neon is able to move only

within one sixteenth of the shell. In another word, the density of electron cloud in neon's outer layer is approximately sixteen times that of hydrogen atom. Therefore, neon's outer layer is a spherical shell with quite compact and even electron cloud. So, it is a very stable inert molecule.

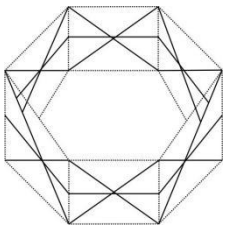
{3} For stable structure of benzene molecule, it can give satisfied explanation by the wave ring structure. Benzene is interlocked by 6 carbon atoms and 6 hydrogen atoms, every carbon atom has one wave ring to realize interlock with hydrogen and the residual 3 wave rings form a ring with the carbon.



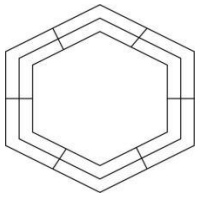
Straight chain WR formula Of benzene ring



The formula of benzene's WR molecule



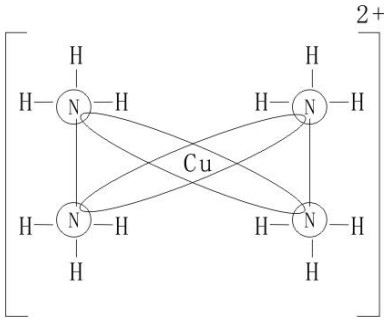
The interlock frame of benzene ring

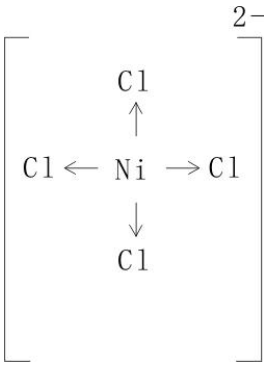


The simplified formula of benzene

In the benzene ring, the carbon atom is located in center of the 6 edges instead of peaks of the 6 corners. Between the carbon and carbon, there are 3 wave rings realizing mutual interlock and there is no single-bond and double-bond. In addition, two ends of such 3 wave rings realize interlock with neighbored atoms. Therefore, the benzene ring is quite stable and is not easy to be disconnected.

{4} The stability of coordination compound lies in that both sides of the electron WRs outside the central coordination ion either interlock or embed in the ligand, such as $[Cu(NH3)_4]^{2+}$ and $[NiCl4]^{2-}$ coordination ions.

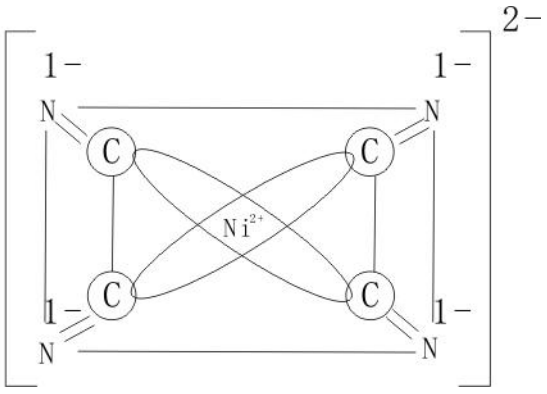




{5} Some complicated WR`s formulas of the coordination ions are presented as following:

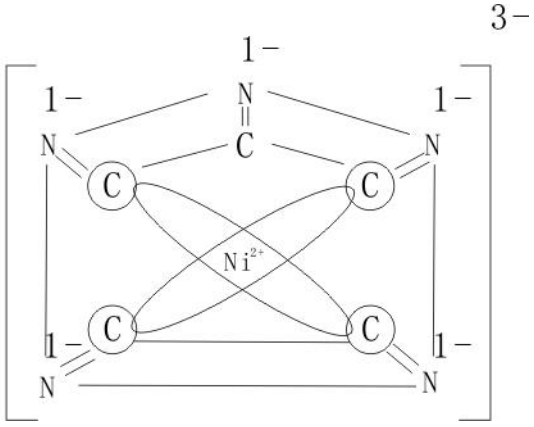
(1) $[Ni(CN)_4]^{2-}$

$2^{+}+4^{-}=2^{-}$

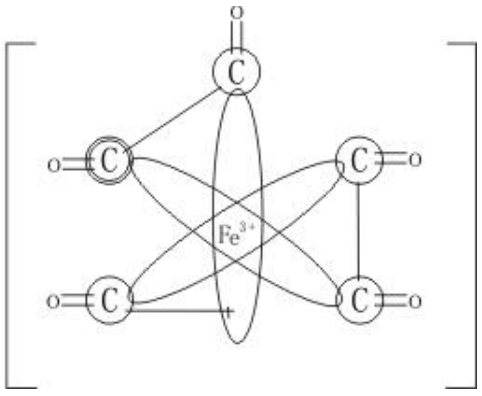


(2) $[Ni(CN)_5]^{3-}$

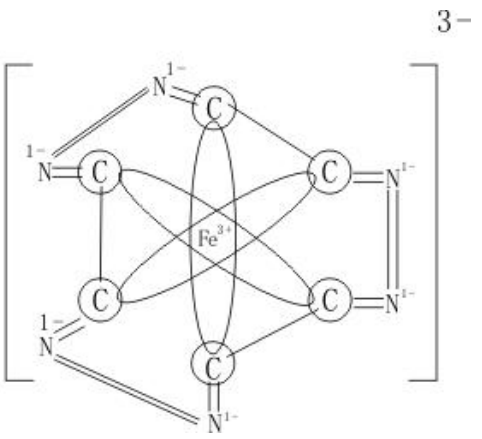
$2^{+}+5^{-}=3^{-}$



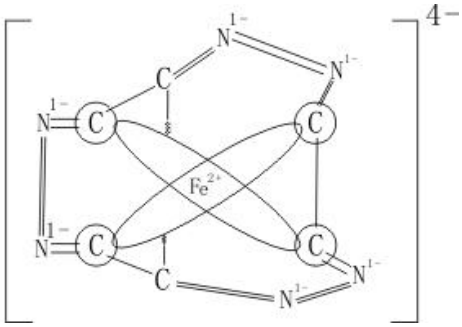
(3) $[Fe(CO)_5]$



(4) $[Fe(CN)_6]^{3-}$ $3^+ + 6^- = 3^-$



(5) $[Fe(CN)_6]^{4-}$ $2^+ + 6^- = 4^-$



{6} The essence of 18-electron structure of complexes is to enable the outmost electron shell to have the axis and layer structure for inert gas element, namely total electron number of the 3 axes in the outmost layer is $Z_2X_8Y_8$. The only difference is that inert gaseous elements require 18 electrons at three axes composed of no less than two main electron layers to a great extent. For example, it is observed from table: $Ar[Kz_2Lx_8My_8]$; $Kr[Mz_2x_8Ny_8]$.

Central atom of tilted sandwich compound is in the main electron shell of its final electron in configuration, there are more or less electrons in its final ZXY axis and layer, the function of ligand is to supplement the deficient part. The following shows an example of supplement mode for central atom of cyclopentadienyl, central atom of complexes may accept or reject the number of electrons embedded from ligand, and this is very obvious for cyclopentadienyl as ligand. For tilted sandwich compound, if central atom is electron rich, it shall only supply 5 electrons.

For example,it is observed from table $W[Oy_8z_2x_4]Cp_2H_2$； $Re[Oy_8z_2x_5]CP_2H$ ； $Ta[Oz_2x_3]CP_2H_3$, its calculation procedure is as follows:

W(z.x.y)=2+4+10+H2=18
Re(z.x.y)=2+5+10+H1=18
Ta(z.x.y)=2+3+10+H3=18

If central atom is electron deficient, cyclopentadienyl shall supply 6 electrons. For example, it is observed from table that the calculation of $Ti[My_8z_2x_2]CP_2Cl_2$ is as follows:

Ti(z.x.y)=2+2+12+Cl2=18

If the central atom lack E axis, it can constitute the 16-electron structure of complexes.