IJSRM
INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY
An Official Publication of Human Journals

Human Journals
**Review Article**
March 2017 Vol.:6, Issue:1


# The Structure of "Chemical Individuals" and the Transfer of Heat

IJSRM
INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY
An Official Publication of Human Journals

**[*1]Utelbayev BT, [1]Suleimenov EN, [2]Utelbayeva AB**

*[1]Kazakh - British Technical University*

*[2] South Kazakhstan State University*

**Submission:** 10 March 2017
**Accepted:** 15 March 2017
**Published:** 25 March 2017

**Keywords:** microstructure, "an individual chemical", electron, "teplotron", photon, an elementary particles.

**ABSTRACT**

At the chemical reactions change the structural energy state of "chemical individuals" of reactants in the redistribution of elementary particles. Based on the analysis of redox reactions suggest a possible mechanism for the implementation of physical - chemical events (heat, light, etc.). That occur as a result of the formation of ordered structures.

HUMAN JOURNALS
**www.ijsrm.humanjournals.com**

## INTRODUCTION

Well, known the energy is a conceptual expression of universal measure of various forms of movement and interaction of material objects, describing qualitative and quantitative characteristics of the transition of matter from one form to another [1-3]. At the same time, the amount of energy is expressed in terms of mass and velocity of the material object according to the equations: $E = mv^2 / 2$, the kinetic energy; $E = mgh$, potential energy; for elementary particles using Einstein's formula $\varepsilon = mc^2$ and M. Plank's equation $\varepsilon = hv$. In the Kinetic- Molecular - Theory of gasses, the average kinetic energy is described by the equation $\varepsilon = 1{,}5kT$, where $k$- Boltzmann's constant, $T$ - thermodynamic temperature, which characterizes the chaotic motion of molecules [3]. The relationship between heat($Q$), work $(W)$, and changes in internal energy $(\Delta U)$ is dictated by the law of conservation of energy, in the form known as the first law of thermodynamics for closed systems [3,4]:

$$\boldsymbol{Q = \Delta U + W,}$$

Where, $Q$- the amount of heat delivered to the system from outside; $\Delta U$- change in internal energy; $W$- number of perfect work. Heat is a form of energy transfer is a complex phenomenon, which in the past centuries, is treated differently from the theory of "caloric" (phlogiston) to modern views. In the present study, we examine the relationship of nature and the possible mechanism of heat transfer between material objects.

## DISCUSSION

Previously, the heat was considered a material substance, suggesting that body temperature is determined by the amount contained therein "caloric fluid" or "caloric". Caloric or phlogiston - weightless fluid that is present in everybody and is the cause of thermal phenomena [5]. According to this hypothesis all the body, capable of burning, contain "phlogiston", which is released during the burning of the body. In 1775, Lavoisier showed that a combustible substance at the combustion in the air joins oxygen, and in 1783, Lavoisier and Laplace, found that hydrogen combustion product - pure water. These discoveries laid the foundations of modern scientific views on the nature of combustion. The hypothesis of phlogiston - caloric was rejected by M. Lomonosov, B. Rumford, J. Joule and other scientists of that time, which were based on the findings of their experiments. In [6], explaining the reason for this conclusion phlogiston, Soddy pointed out: "The spirit of the chemistry of pushing her to the pure materialism. Later defenders of phlogiston theory made a fatal mistake, they have it materialized. With the accession to the science of weights and weighing as material existence

criterion, phlogiston, as the material substance, was rejected, and the theory itself has got a completely undeserved favor. Meanwhile, in its original form, it is a little over a century anticipated the modern doctrine of energy". Negative findings of the phlogiston theory were the reason for the kinetic- molecular theory in the middle of the XIX century. Developing the kinetic - molecular view of the heat transfer B. Rumford placed the two bodies in a vacuum - the heated and cold, where the theory implied that in a vacuum, without any body contact, heat transfer will not be. However, cold body was heated and warm - cooled and explain this experience could not be within the kinetic – molecular theory. Therefore, the heat is the kinetic part of the internal energy of matter, determines the intensity of the random motion of the molecules and atoms from what consist the substance but result was clearly contrary to experiment. In [7] shows the basic error of the kinetic- molecular theory which is the neglect of the "thermal photons" as equal particles of the system. The author of this paper has calculated that gas molecules do not move and vibrate in place under thermodynamic equilibrium. These and other polar opinions about the nature and mechanism of heat transfer requires a rethinking of the approach to the processes of thermal phenomena, taking into account the provisions of classical thermodynamics [3,4,8], which have been successfully used in practice in different areas of technology (energy, heating engineering, chemical engineering, etc.). Processes occurring in reality, where the parameters are described by, temperature, pressure, concentration and others, which involves a large number of particles. In turn, the state and properties of the interaction of many particles are characterized by statistical thermodynamics [9], which in general is phenomenological. Depth understanding of the interaction is limited to a set of particles and does not allow to reveal the nature of the influence of microstructure on the studied phenomena in the energy transfer between the material objects. There is a neglect of the nature of the motion of elementary particles in the microstructure of the "chemical individual"[10], which determines the properties of the entire macroscopic system. For example, the existence of singlet oxygen detected by H. Kautski [11], demonstrates the influence of the structure of "chemical individual" oxygen its energy state. The reference data, of energy difference between the lowest energy molecular oxygen in a singlet state, and the lowest energy triplet state is about 11400 Kelvin ($T_e$ ($a^1\Delta_g \leftarrow X^3\Sigma_g^-$)= 7918,1$sm^{-1}$) or 0.98 eV per molecule (94,2kJ /mol). The amount of thermal energy in the matter cannot be evaluated by observing the motion of each its molecule individually. Only by studying the macroscopic properties of the substance can be found averaged over a certain period of time the characteristics of components and the microscopic movement of elementary particles and molecules; their physical and chemical characteristics. In this

regard, we have grounded a new elementary particle - a carrier of heat "teplotron" [12-17], makes it perfectly clear in the concept of “heat transfer" and allows you to simultaneously consider the processes at the micro - and macro levels. It is well known that all the energy values refer to a unit amount of substance, hence the "energy" is a property of the matter. A system contains only internal energy. Heat and work are the means by which a system exchanges energy with its surroundings [2-4,8,9]. A system does not contain energy in the form of heat or work. Heat and work exist only during a change in the system as a result of the process and ends with the termination of the process [8,9]. The energy transfer realizes equivalent to a perfect work (mechanical, chemical, biological, electrical, etc.) and the change in internal energy in a variety of physical and chemical events (heat, light, etc.). The chemical reaction is the chemical work which changes the internal energy of the system by accomplishing heat transfer, light or other. All these works characterize by a transfer (redistribution) of elementary particles (electrons, for example, shown by M.Faradey [18]). In these processes is strictly observed mass conservation law and the energy based on the equivalent amount of energy transfer. We in [14-17] for the chemical interaction of hydrogen with oxygen, given the heat of formation of water, analyzed the amount of heat flow and its balance in various stages of physical transformation. On the basis of quantum-mechanical, spectral and thermochemical data to be calculated the probability mass and velocity of an elementary particle - the carrier of heat, called - "teplotron" - in the absence of the strict terms of the conclusions and in the scientific literature that characterizes the heat transfer process. The calculations mass of a "teplotron", based on the use of thermochemical data hydrogen combustion heat, showed that its mass is equal to $5.15 \cdot 10^{-36}$ kg, and according to wave optics **3**.$87 \cdot 10^{-36}$kg [14-17]. The values of mass "teplotron" defined by two different methods ($5{,}15 \cdot 10^{-36}$kg and $3.87 \cdot 10^{-36}$ kg) show good agreement in the absence of targeted experimental data. The calculated weight "teplotoron" explains F.Soddi idea why phlogiston theory was rejected. Features weighing technology of the time did not allow to estimate the weight loss system with exothermic reactions. For one mole of "teplotron" its mass is $6.02 \cdot 0^{23} \cdot 5, 15 \cdot 10^{-36} = 3{,}1 \cdot 10^{-12}$kg. In [19] it is noted that the weight of one mole of hydrogen is known to actually significantly less accuracy - up to $1 \cdot 10^{-8}$ g. Consequently, conventional means to detect this change in weight is impossible even for the recombination of $H + H = H_2 + 435$ kJ, in the best energy to chemical reaction, the more impossible in other cases.

From the available literature and experimental data, we can conclude:

- Under stationary state, the material object is in dynamic equilibrium with the surrounding and the microstructure of "chemical individual" does not change;

-with the impact to the system by energy from outside the structure-energy state (SES) of "chemical individuals" is changed. And the difference of the chemical potential of "chemical individuals" equal reflects the amount of work and energy of other physical and chemical manifestations;

- the process exchange of internal energy between bodies at the contact, realize without work by elementary particles, in particular, by "teplotron" which its concentration expresses the temperature of a system and characterize the heat change. The temperature is directly related to the quantitative characterization of the thermal equilibrium of the system is the average intensity of the movement of elementary particles emitted during the change of the energy structural conformity "chemical individuals." By "chemical individual" we offer to realize the primary structure (basic unit), which is responsible for the formation of the macroscopic structure of substance [10].

In the above, at the first case the structural energy accordance of "chemical individual" is not broken, however, the continuous movement of elementary particles around the nucleus and between them refers to the process, i.e, it characterizes the energy transfer form. According by M.Faradey [18], each charge creates its own "electromagnetic field" and it to be related to a special form of matter, through which realize the interaction of charged particles [20]. Therefore, in the "chemical individuals" can assume the existence of a special "elementary particle" as a result of realizing a steady state process. Such "elementary particles" [21] proposed to call "electromagnetic particles" representing "dipoles" with the corresponding pulse frequency. In our view, a set of discrete “dipoles" by pulsation creates an atmosphere of "electromagnetic field" predicted by M.Faradey their move is presented as an electromagnetic wave [18,20,21]. However, thermal or other physical and chemical manifestation can take place in the system only if the microstructure of "chemical individual" is changed. On the basis of the above considerations, it is possible two kinds of elementary particles of “chemical individual ":

- The first, "dipoles" - polarized elementary particles for a given structure - energy state of "chemical individual" without changing its structure;

- The second, elementary particles to be related to transfer of heat "teplotron", light- photons etc. which manifested during the process of changing the structure of "chemical individual". The elementary particles of the first and second types only occur during the process. This raises the question: "Where contains and how to manifest heat carriers - "teplotron" in material objects?"

To answer the question, consider an exothermic reaction, in particular, combustion, where the redistribution of particles at chemical reaction releases huge amounts of heat and light. According to the stoichiometric equation of chemical reaction in the "chemical individuals" the number of electrons remains constant, however, the generated heat is dissipated in part into the environment. In [22], wondering power dissipation during its preservation, the solution of the paradox motivated by the fact that the heat associated with the movement of molecules and "disappearance energy" transformed into the energy of the movement. This contradictory statement allows only a molecule can be concluded of heat carriers. Because heat is a form of transfer of energy, then the termination process (chemical reaction) and stops the transmission of heat. Furthermore, if the structure of "chemical individual" does not change, then the motion of the molecules in the absence of friction between them, heat generation does not occur. By reference data, average velocity of electrons in metals is $1 \cdot 10^6$ m/ s, but at such a speed does not occur heat in the system. Despite this, at the exothermic reaction in the redistribution of chemical bonds, where one of the main participants are elementary particles, is released huge amounts of heat. For example, the combustion of fuels as a result of the redistribution of particles released by chemical bonds huge amount of heat and light. This experimental data provides an indication of the fact that the participants of these manifestations are electrons, "teplotrons" photons and other. In our view, the following options are possible allocation of heat, light and other:

- the first, when the structure of "chemical individual" is changed by the movement of elementary particles, change the structural energy state of the system, and a corresponding impact on the nature and character of movement of the first type "elementary particles". The result is a change of frequency in the "pulsation" [21], according to the frequency such as at UR and optical radiation [14,16], which lead to the release of heat and light particles;

- the latter, because of the physical and chemical manifestations associated with redistribution of elementary particles in the chemical bonds, the release of heat, light and others suggest the

formation of a combination of the elementary particles of the second type in "chemical individual".

When changing the microstructure of "chemical individuals" and the redistribution of chemical bonds the disintegration of the combination of elementary particles by release the second type of particles such as “teplotron, photon and other. Therefore, there is no point in material objects to seek the presence of the explicit form of heat and light. Thus, in the composition of water to seek individual hydrogen or oxygen gasses meaningless, but it is possible to produce hydrogen and oxygen, by decomposition of water, if it necessary. Similarly, the interaction "teplotron", photon and others with an electron forms a combined particles of where these particles do not show individual properties of heat, light, and others. in the structure of "chemical individual". Similar combinations Feynman called "compound", "communication" or "interaction" [23]. In this regard, well-known concept in quantum chemistry "degeneracy of the energy levels" by thermal activation of atom orbitals to form $sp^3$, $sp^2$, *spd* and other also shows electron combination with "teplotron" or other elementary particles. The concept of elementary particles combination we proposed in [24].

In our view, the role of "teplotron" can be traced at the combustion process which divided to deflagration and detonation. Front of deflagration at the combustion moves with subsonic speed and activate the initial mixture mainly by thermal conductivity. In the second case, in our opinion, the heat evolved by “teplotron" to create a detonation wave that moves at supersonic speed and activates a chemical reactants maintaining a stable propagation of the shock wave creating heat and pressure [25]. According to this principle operates cumulative projectiles. Many processes by prior interactions of elementary particles "chemical individual" proceed on the principle of “falling dominoes" or with an explosion at a low activation energy. For example, taking into account the lower and upper limits self-igniting the gaseous mixture of hydrogen and oxygen (detonating gas) or air are explosive. Activation this mixture by a spark or other source of a mixture of hydrogen with a small volume of air is burned very quickly, with a loud bang that subjectively perceived as an explosion. Indeed, in reality, a spark of energy 17 microjoules that the explosion occurred in the system. Detonating gas can be stored indefinitely at room temperature in the absence of heat sources. It ignites at atmospheric pressure and a temperature of 510°C, where this temperature is sufficient to separate the "teplotron" from the combination. Consequently, electrons are released from the elementary particles of the second type - "teplotron", photons from the

combinational form and tend to energetically favorable structure of the new "chemical individuals". The ongoing process shows that the released heat causes the ordering of the structure [26]. Hence the basic principle formulated by Prigogine [27], according to which non-equilibrium processes in an open system can be a source of self- organization**.**

The redox reactions of the exothermic nature such as aluminothermy type where the reactants and products remain in the reaction zone, and a great amount of heat is dissipated to the environment [28], the development of a process when changing the microstructure of "chemical individuals" without loss of the bulk of condensed system leading shows the role of "teplotron" in the transfer of thermal energy. Flameless combustion burners or certain modes of exothermic decomposition ballistic powders at low pressure, based on the transfer of heat by "teplotron". In turn, the flameless oxidation - a special way of organizing low-temperature combustion, which is one of the most promising directions in the creation of low-emission combustion chambers for power units [29].

**CONCLUSION**

The macroscopic properties of substances depend on the microscopic structure of "chemical individuals" which are its basic element. The structural energy state of material object is in dynamic equilibrium with environmental elements.

Elementary particles may form a "combination", which does not exhibit the properties characteristic of the individual particles such as "teplotron", photon and other.

Changing the structural energy state of "chemical individuals" leads to the disintegration of "combination", so that there are a variety of physical and chemical manifestations in the form of heat, light and other.

The elementary carriers of heat are "teplotrons", light - photons and electromagnetic particles accumulate in the structure of "chemical individual" as a "combination" to detect explicitly are difficult.

Acceptance of the transfer process heat by discrete particles such as "teplotron" will enable the creation of new technical solutions for the efficient use of energy resources.

## REFERENCES

1. Belozerov IR The energy and the structure of matter // Proceedings of the scientific conference "Intellect - 2008". - Krasnoyarsk: Publisher KRO NA «Integration», II of the 2008, PP. 231-238 Russian
2. Fundamental interaction of matter and energy. www.decoder.ru/list/all/topic_77/
3. Sivuhin DV The general course of physics. Thermodynamics and Molecular Physics, Volume 2, M .: Nauka, 1990. - 591p.Russian
4. Physical chemistry / Ed. KS Krasnov- M .: High school, 1982.-687p. Russian
[5] Electron resource. https://ru.wikipedia.org/wiki/Теплород
6. F. Soddy Matter and energy. Publisher "Nature", Moscow, 1913, 182p
7. Provincial A. What is the temperature, pressure and sound in gases in terms of quantum mechanics 314159.ru/voevodskiy/voevodskiy2.htm
8. R. Kubo. Thermodynamics / Ed. Translation DN Zubarev, NM Plakida. - M .: Mir, 1970.-304p. Russian
9. Kvasnikov, T.Thermodynamics and statistical physics Vol. 1, 2002, p. 11. Russian
10. Utelbayev B., SuleimenovE., UtelbayevaA., ZhanabayN. Some Concepts about Substance, Chemical compound and an Element// American Chemical Science Journal. 2014.4 (2) RR.166-73
11. NS Titova Research ignition and combustion of hydrogen and methane in gas flows in the excitation of the electronic degrees of freedom of molecules oxygen.//ru.wikipedia.org/wiki/. Russian
12. Utelbaev B.T. Suleymenov E.N., UtelbaevaA.B.Possible mechanism of the thermal activation reactants // Science and World. International scientific journal.-2015.-№4 (20), Vol.1.-P.88 Russian
13. B.T.Utelbayev, E.N.Suleimenov, A.B.Utelbaeva. TheHypothesis about Heat Transfer and Nature of its Carrier // PONTE. Florence, Italy, International Scientific Researches Journal. Vol.72.No.2.Feb.2016, pp.18-25.
14. B.T.Utelbayev, E.N.Suleimenov, A.B.Utelbaeva. Interconnection of heat and mass changes of the reacting substances at Physical and Chemical Transformations. // J. Chem.Bio. andPhy. Sci. April 2015; Vol.5, No.2; 1783-1790.
15. UtelbaevB.T., SuleymenovE.N., UtelbaevaA.B. to transfer heat between the material objects .// Science and World. 2015 v.1 №2 (18) PP.39-43. Russian
16. Utelbaev BT, Suleimenov EN, Utelbaeva AB/ Use the Gibbs fundamental equations to calculate the mass and velocity of particle heat carriers// Science and World. International scientific journal. 2015. Vol. 1-№3 (19), PP.45-49. Russian
17. BT Utelbayev, EN Suleimenov, AB Utelbaeva. The Nature and Mass of Elementary Particles of Heat Carriers // International Journal of Scientific Latest Research in Science and Technology.Vol.5.Issue6: Page No: 6-9, November-December 2016 ISSN (Online) 2278- 5299.
18. M. Faraday, Experimental Researches in Electricity. Vol.1.M. Publisher of the USSR Academy of Sciences, 1947. - 848 p. Russian
19. Guzey LS. Fundamental concepts of general chemistry in school course. Chemistry and Life. 2005, No. 17. Russian
20. Tarasov LV Modern physics in high school. M: Education, 1990.-288p. Russian
21. Utelbaev B.T., Suleymenov E.N., Utelbaeva A.B. The nature of the movement and transfer of energy forms. // Science and World. International scientific journal.-2016.-№9 (37), Vol.1., PP.32-35 Russian
22. Smorodinskiy Ya. A. Temperature. M.: TERRA- Books club, 2008.-224p. Russian
23. Feynman, P. QED strange theory of light and matter / M.: AST, 2014.-194p. Russian
24. Utelbaev BT, Suleimenov EN, Utelbaeva AB Forms of transfer of internal energy and its carriers .// "Globus", 2015 December 3 part s.122-129
25. Theory of combustion and explosion: / O.G.Kazakov: Edit by AV.Totaya, OG.Kazakova -2nd ed. M: IzdatelstvoYurayt, 2013.-295p. Russian
26. B.T.Utelbayev, E.N.Suleimenov, A.B.Utelbaeva. Effect of Elementary Carries of Heat to Create a System of Ordered Structures // International Journal of Scientific Latest Research in Science and Technology.2017.Vol.3.Issue1: PP. 50-54,
27. Nikolis G., Prigogine I. Self-organization in nonequilibrium systems: From dissipative structures for ordering through thermal fluctuations. M .: Mir, 1979 - 512p. Russian

28. Alyuminotermiya // The Great Soviet Encyclopedia: [in Vol.30 ] / Ch. Ed. Prokhorov. -3-rd. - Moscow: Soviet Encyclopedia, 1969-1978. Russian
29. Novozhilov. Unsteady combustion of solid rocket fuels .M: Science. 1973 175p. Russian