© 2017 IJSRSET | Volume 3 | Issue 2 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

The Essence of "Temperature" and its Relationship with Thermal state of the System

[1]Utelbayev B. T., [1]Suleimenov E. N. ,[2]Utelbayeva A.B.
[1]Kazakhstan - British Technical University
[2]South-Kazakhstan State University named after M. Auezov, Kazakhstan

ABSTRACT

It is shown the essence of the concept of "temperature" and its connection with the transfer of heat were analyzed between the material objects at the micro-macro level of the system. New fundamental concepts such as heat transfer by its carriers "teplotron", the possibility forming "combinations" of elementary particles, the "pulsation" of microobjects, etc. can be used to develop modern technologies aimed to creating new materials and rational use of natural resources.

Keywords : Temperature, Chemical Individual, Electron, Teplotron, Photon, Combination of Elementary Particles

I. INTRODUCTION

Material objects are characterized by the amount of substance (***n***), and the parameters of the state of volume (***V***), pressure (***P***) and temperature (***T***). The relationship between these quantities for an ideal gas is expressed by the Mendeleev-Clapeyron equation in the form: $PV = nRT$. Here the temperature is a physical quantity that quantitatively expresses the degree of heating of the system at constant pressure and directly relates to heat [1-12]. Although the named parameters - heat and temperature seem very simple, they require detailed consideration of their physical essence for establishing the fundamental laws of heat transfer between material objects. In this relationship, the word "temperature" arose in those days when people believed that in more heated bodies contains more of a special substance - heat, than in less heated [7]. In the molecular-kinetic theory, which refutes the theory of heat and phlogiston, it is asserted that temperature is the average kinetic energy of the motion of atoms and molecules of the system. In statistical thermodynamics, the temperature of a system is characterized by the distribution of particles over energy levels and their velocities, etc. [3,5,6,10-12]. In general, for a system in thermodynamic equilibrium, when all these parameters are in the same thermal state, they are simply called **temperature** of the system [3-6,8,9,12]. Such a difference in the temperature characteristic means the absence of a single scientific concept of "temperature."

This article considers a general approach to explaining the physical and chemical processes of the formation and development of the structure of material objects and the essence of new fundamental concepts, in particular, heat transfer by "teplotrons", the possibility of forming "combinations" of elementary particles and "pulsation" of microobjects.

II. DISCUSSION

In the course of thermodynamics it is said that heat and work are forms of energy transfer [3-6,12], i.e., the change in the internal energy of the system as a result of the process is expended to create the work and release (absorption) of heat, light, etc. In [12] Smorodinsky notes: "... that one can not speak of the amount of heat enclosed in the body. This concept simply does not make sense". In our opinion, this assertion requires specification, since the constituent elements of the system under stationary conditions are in thermal equilibrium with each other and with the environment. In this case, the thermodynamic system is characterized by the parameters of the state ***P*** (pressure), ***V*** (volume) and ***T*** (temperature), and for a mole of ideal gases these quantities are related in the form of the equation $PV = RT$. Any system is characterized by a certain value of "heat content"(entalphy) and temperature. Depending on the interaction conditions, there may be an increase in "heat content" when the system is heated, and vice versa, it decreases with cooling. At a certain value of the heat content and the corresponding temperature under the influence of thermal, light energy and other factors, chemical and biochemical reactions occur, in particular, ensuring the vital activity of the living and plant world; there are phase transitions and many other changes in the "chemical individuals" of substances. By "chemical individual" we suggest to understand the primary elementary structure (elementary link), which is responsible for the formation of the structure of macroscopic formation [13]. Consequently, the physical and chemical properties of macrosystem are the function of their microstructure. The structure of microstructures includes various elementary particles, interconnected with each other and each of which is endowed with certain properties, the set of which expresses the corresponding parameters of the state ***P, V***, ***T*** and the internal energy of the system.

It is common knowledge that all energy values relate to a certain amount of matter, therefore, "energy" is a property of the matter which characterizes its movement qualitatively and quantitatively, and heat and work are forms of energy transfer [3-6,12]. In a material object heat and work are manifested as a result of the process and cease with the termination of the process [8,9]. However, the movement of the structural elements of the "chemical individual" makes it possible to judge the continuous flow of processes that result in the energy exchange [14], and, therefore, there is an exchange by elementary particles - energy carriers, the magnitude of which is described by the equation of M. Planck:

$$\varepsilon = h\nu$$

where ***h*** - is the Planck's constant ($6.6261 \cdot 10^{-34}$ J · s); ***v*** - is the frequency of the electromagnetic wave, ***Hz***. In this equation, derived for describing the thermal radiation of an absolutely black body, we proposed in [15] the physical essence of the motion of "elementary particles" ("teplotrons", photons, "combinations of elementary particles," etc.). Similarly, elementary particles formed in "chemical individuals" interacting with the components of the environment create a dynamic equilibrium of the corresponding thermal state. Here, "temperature" characterizes the degree of heating of the body (substances) at thermal equilibrium. According to [16], the physical meaning of the thermodynamic temperature is a measure of the average kinetic energy of the thermal chaotic motion of molecules in states of an ideal gas:

$$\varepsilon = 1{,}5kT$$

However, we showed in [17] that the discrepancy between the values of the energy of the thermal chaotic motion of water molecules calculated for kinetic energy at ***3173K*** is $39.54 \cdot 10^3$ ***J / mol*** and experimentally determined by thermochemical data of $285.8 \cdot 10^3$ ***J / mol*** (the value of **3173 K** corresponds to maximum temperature of combustion of hydrogen in oxygen). An essential difference in the values of heat determined by two different traditional methods means that in addition to thermal motions of molecules, one should also take into account the motion of elementary particles, which is suggested to be considered the internal energy of a material object. Consequently, this requires, along with the translational motion of the molecules themselves, to take into account the motion of elementary particles of constituent atoms and molecules, i.e., elementary particles of "chemical individuals". In this respect, the new elementary particle, the carrier of heat - "teplotron" [14,15,18-23], suggusted by us, brings clarity into the concept of "transfer of thermal energy" and allows to simultaneously consider processes at micro- and macrolevels. The elementary carrier of heat is called "teplotron" - in connection with the absence of strict definitions and terms in the scientific literature that characterize the process of heat transfer at the level of "elementary particles". In statistical thermodynamics at a given temperature, the total kinetic energy of the motion of atoms and molecules is assumed to be $\Sigma x_i kT$. We assume, that the heat transfer between the structural elements of the system is carried out by "teplotrons", then for these elementary particles the kinetic energy can similarly be assumed:

$$\varepsilon = \Sigma x_i\, kT$$

where ***k-*** is the Boltzmann's constant ($1.3806 \cdot 10^{-23}$ ***J / K***); ***T*** - is the thermodynamic temperature of the system, ***K***; Σx_i is the total number of the contribution of ***kT*** to the translational, rotational-vibrational and other ***i-th*** kind of particle motion. To other types of motion, we refer "***pulsation***" of elementary particles [14, 15], quantitative and qualitative characteristics of its continuous interaction with the environment. According to the statistical thermodynamics, the energy of translational motion of particles is ***1.5kT***; the energy of the rotational motion ***kT*** , and taking into account the vibrational-pulsating motion of particles, their sum can be taken as $\Sigma x_i kT$. Under the condition of thermal equilibrium of the system, the total value of the contributions of the kinetic energy of the elementary particles of the heat carriers should be equal to the energy of the quanta of thermal radiation, i.e, for the same particle, the following equality must hold:

$$\Sigma x_i\, kT = h\nu.$$

In contrast to the frequencies (***ν***) in M. Planck's equations, $\varepsilon = h\nu$, in the given reasoning ***ν*** -refers to the frequency of "***pulsations***" of elementary particles, which creates a picture of ***a standing wave***. To determine the number Σx_i, we use the spectroscopic data of ***IR*** radiation. According to existing views, heat transfer in a vacuum is attributed to infrared radiation [25]. In this respect, it is considered that thermal radiation is a process of "propagation of the internal energy of a radiating body". ***IR*** radiation depends on temperature and with increasing temperature there is an intense emission of thermal particles, each of which carries a quantum of energy and participates in heat-exchange processes. On the basis of spectroscopic data [25] for a different range of infrared radiation, we can calculate the total number Σx_i of the contribution kT. It follows from the above formula that the temperature of the system is proportional to the frequency of "pulsations" of the elementary particle:

$$T = h\nu / \Sigma x_i k = 6.6261\cdot 10^{-34}\cdot \nu / (\Sigma x_i \cdot 1.3806 \cdot 10^{-23}) = 4.7994\cdot 10^{-11} \cdot \nu / \Sigma x_i$$

where ***ν*** - is the frequency of the "pulsation" of the elementary particle, c^{-1};

In the theory of the specific heat of a solid in Debye's works for a maximum vibration of atoms, the ratio $h\nu_{max} / k$ is called the characteristic temperature - the "Debye temperature" [8]. Similarly, in the law of the displacement of Wine, derived using the laws of thermodynamics with respect to electromagnetic radiation, the relationship between temperature and the radiation frequency is expressed [26]:

$$\nu_{max} = \alpha kT / h$$

where, $\nu_{max} = c / \lambda_{max}$ and c -is the speed of light in vacuum; ν_{max} and λ_{max} - the maximum frequency and wavelength of the radiation; h -is the Planck's constant; k -is the Boltzmann's constant; α –Wine's constant equal to $0.002898\ m\cdot K$ and T-temperature. The **Wine formula** establishes the wavelength (frequency) of the wave, at which the blackbody energy flux reaches its maximum, from the temperature of an absolutely black body. However, the physical meaning of the temperature itself, as one of the state parameters characterizing the thermal equilibrium of the system, is not disclosed in these formulas and in the scientific literature. From the equation $T = h\nu / \Sigma x_i k$ for infrared radiation of the near range at temperatures **4000K** and **3620K** with frequencies $\mathbf{4\cdot 10^{14}}$**Hz** and $\mathbf{3.8\cdot 10^{14}}$ **Hz,** respectively, we determine the total number of the contribution Σx_i**:**

$$4000 = 4.7994 \cdot 10^{-11} \cdot 4 \cdot 10^{14} / \Sigma x_i$$
$$\Sigma x_i = 4.7994 \cdot 4 \cdot 10^3/4 \cdot 10^3 = 4.79$$
$$3620 = 4.7994 \cdot 10^{-11} \cdot 3.8 \cdot 10^{14} / \Sigma x_i$$
$$\Sigma x_i = 4.7994 \cdot 3.8 \cdot 10^3/3620 = 5.03$$

For the average range at temperatures of **2070 K** and **600K** with frequencies of $\mathbf{2.17\cdot 10^{14}}$ and $\mathbf{6\cdot 10^{13}}$ Hz, respectively:

$$2070 = 4.7994 \cdot 10^{-11} \cdot 2.17 \cdot 10^{14} / \Sigma x_i$$

$$\Sigma x_i = 4.7994 \cdot 2.2 \cdot 10^3/2070 = 5,1$$
$$600 = 4.7994 \cdot 10^{-11} \cdot 6 \cdot 10^{13} / \Sigma x_i$$
$$\Sigma x_i = 4.7994 \cdot 6 \cdot 10^2/600 = 4.79$$

For the long range at temperatures of 290 K and 90 K with frequencies of 3 · 1013 and 1 · 1013 Hz, respectively:

$$290 = 4.7994 \cdot 10^{-11} \cdot 3 \cdot 10^{13} / \Sigma x_i$$
$$\Sigma x_i = 4.7994 \cdot 3 \cdot 10^2/290 = 4.96$$
$$90 = 4.7994 \cdot 10^{-11} \cdot 1 \cdot 10^{13} / \Sigma x_i$$
$$\Sigma x_i = 4.7994 \cdot 1 \cdot 10^2/90 = 5,33$$

Determine the average value for Σx_i:

$$\Sigma x_i = (4.79 + 5.03 + 5.10 + 4.79 + 4.96 + 5.33) /6 = 5.0.$$

Hence the total kinetic energy of the thermal motion of an elementary particle:

$$\Sigma x_i kT = 5kT$$

Then for a system in thermal equilibrium with the environment, the following equality holds:

$$5\, kT = h\nu.$$

The left-hand side of the equation expresses the total contribution of the kinetic energy of the motion of elementary particles to thermal equilibrium, and the right-hand side characterizes the quantum-mechanical energy of a particle of thermal radiation in this state. Consequently, the equality implies that the temperature of the system depends on the frequency of "pulsations" of elementary particles -ν- responsible for the thermal state:

$$T = h\nu / \Sigma x_i k = 0.959 \cdot 10^{-11} \cdot \nu,$$

where $h / \Sigma x_i \cdot k = 0.959 \cdot 10^{-11} K \cdot s$ is the temperature constant of the elementary particle - the carrier of heat. Consequently, the formula $T = 0.959 \cdot 10^{-11} \cdot \nu$ determines that the **temperature** characterizes the "**intensive",** and **entropic** -extensive properties of the system. From here we can draw a conclusion:

The temperature of the system in thermal equilibrium is determined by the frequency of pulsations of the elementary particles of the heat carriers - the "**teplotrons",** and the *arrangement of the structural elements of the "chemical individual" is characterized by the* **entropy factor**. When the heat Q is transferred to the system its entropy changes to ΔS, and at the thermal state temperature is equal to T, then:

$$Q = T \Delta S \text{ or } Q = 0.959 \cdot 10^{-11} \cdot \nu \cdot \Delta S$$

This formula connects the **amount of heat** with the change of internal arrangement of "**pulsation" particles** of the material object describing by **entropy**, and usually characterizing by **temperature**, **revealing its physical essence** for any thermodynamic system.

Consider the process of photosynthesis, where the transfer of heat is effected by the action of sunlight, moisture, carbon dioxide and other factors, where carbohydrates are mainly formed. In plants (in general, fuels and other combustible substances), it is impossible to detect the absorbed "heat" and "light" in an explicit form [22, 23]. However, when burning them, they are back allocated in the form of heat, light, etc. (conditionally for the elementary link):

$$C_6H_{10}O_5 + O_2 \rightarrow CO_2 + H_2O + \Delta H + \text{other.}$$

It should be noted, that the amount of oxygen released during photosynthesis is equivalent to being absorbed in the burning of plants. A set of elementary particles with a characteristic frequency of "pulsations" formed at "chemical individuals" of substances under stationary conditions [14,15,22,23], are in thermal equilibrium with the environment perceived as **electromagnetic waves (field)** or "**ether**." Impact to the system from outside by energy affects the structural and energy correspondence of "chemical individuals" and change in the number and frequency of "pulsations" of elementary particles [14,15,22,23]. With enough energy, the system goes into a "quasi-atomic-state". As a result of the interaction of nuclei with valence electrons during their displacements, pulsating elementary particles are additionally allocated, which, due to a violation of their equilibrium, tend to create a chaotic effect of heat, light, etc. in the environment [24]. The valent electrons emitted the elementary particles -carriers of heat, light and after it participate in the formation of a new bond by the principle of the greatest difference in chemical potential ($\Delta\mu$):

$$\Delta\mu = \mu \text{ (finite)} - \mu \text{ (initial)}$$

where, **μ-** is the chemical potential of "quasi-atoms". At the such displacement of electrons and elementary particles, chemical work is performed on bonds numerically equal to **Δμ,** with the formation of the ordered structure of the "chemical individual". This is the manifestation of the **fundamental principle** of Prigogine I.[27], **where nonequilibrium processes serve as a source of self-organization.** All these data allow us to admit about direct "combinations" of electrons with elementary carriers of heat, light at the micro level [14,15,23,27]. It should be noted that in the composition of "combination" the photon or the "teplotron" does not exhibit the properties of heat, light, and it is impossible to detect them in an explicit form. The manifestation and transformation of them in the process demonstrate one of the fundamental properties - the "interconversion of elementary particles" with the formation or disintegration of "combinations" [16,22,23]. The decay or formation of "combinations" of elementary particles with changes in the structural-energy state of the "chemical individual" of the system characterizes the energy exchange between material objects. A comparative analysis of the data [15,21,24,28,30] and the calculation of some characteristics of the elementary particles of the carriers indicate the simultaneous presence of carriers of heat and light (Table 1). The transition from some types of elementary particles to others is expressed in their frequency of "pulsations" . For example, for the maximum temperature of **3173 K** under hydrogen combustion [31], according to the formula $T = 0.959 \cdot 10^{-11} \cdot \nu$, the "pulsations frequency" of the heat carrier:

$$\nu = T / 0.959 \cdot 10^{-11.}$$
$$\nu = 3173 / 0.959 \cdot 10^{-11} = 3.31 \cdot 10^{14} Hz$$

The calculated value of **3.31· 10^14** Hz is included in the **IR** region by the frequency value, and the particle frequency calculated from the thermochemical data by M. Planck's equation in [30] is **7.16 · 10^14** Hz and falls within the visible light range. Similarly, using Planck's formula $\varepsilon = h\nu$ and the total kinetic energy of the thermal motion of the elementary particle $\varepsilon = \Sigma x_i kT$, we calculate the energy of the elementary particle - the heat carrier at a temperature 3173 K and a frequency of $3.31 \cdot 10^{14}$Hz:

$$\varepsilon = h\nu$$

$$\varepsilon = 6.6261 \cdot 10^{-34} \cdot 3.31 \cdot 10^{14} = 2.189 \cdot 10^{-19} \text{J}$$

$$\varepsilon = \Sigma x_i\, kT$$

$$\varepsilon = 5 \cdot 1.38 \cdot 10^{-23} \cdot 3173 = 2.189 \cdot 10^{-19} \text{ J}$$

Using the coefficient of transition from mass to energy [28], we calculate the masses of the elementary particles of the heat carrier:

$$m = 2.189 \cdot 10^{-19} / 8.98755 \cdot 10^{16} = 2.435 \cdot 10^{-36} \text{ kg}$$

We determine the same mass of the particle with allowance from the equation:

$$\varepsilon = mc^2 ;\ m = \varepsilon / c^2;$$

$$m = 2.189 \cdot 10^{-19} / (3 \cdot 10^8)^2 = 2.432 \cdot 10^{-36} \text{ kg}$$

In the case of combustion of hydrogen in oxygen in [24], the mass of the elementary particle of heat carriers were $5.279 \cdot 10^{-36}$kg and $5.280 \cdot 10^{-36}$kg calculated by two different methods (Table 1). An essence difference in the mass of elementary particles is due to the fact that when hydrogen is burned the heat carriers are the combination of photon and "teplotron" ($5.280 \cdot 10^{-36}$ kg, $\nu = 7.16 \cdot 10^{14}$Hz) in contrast with "teplotron" ($2.432 \cdot 10^{-36}$ kg; $\nu = 3.31 \cdot 10^{14}$Hz).

Table 1. Comparative data of elementary particles of heat carriers

Physical quantity	Calculated by the proposed formulas of this article and reference data [28].	By thermochemical hydrogen burning data [21] and reference data [28].
Mass of the particle, kg	$2.435 \cdot 10^{-36}$ ($8.98755 \cdot 10^{16}$ J / kg) $2.432 \cdot 10^{-36}$ ($m = \varepsilon / c^2$)	$5.280 \cdot 10^{-36}$ ($8.98755 \cdot 10^{16}$ J / kg) $5{,}279 \cdot 10^{-36}$ ($m = \varepsilon / c^2$)
Energy of the particle, J	$2.189 \cdot 10^{-19}$ (IR region)	$4.75 \cdot 10^{-19}$ (For the visible region $\varepsilon \approx 2.55 \cdot 10^{-19}$ - $5.23 \cdot 10^{-19}$ J)
Pulsation of the particle – ν,Hz	$3.31 \cdot 10^{14}$ (IR region)	$7.16 \cdot 10^{14}$ (For the visible region $\nu \approx 3.84 \cdot 10^{14}$ -$7.89 \cdot 10^{14}$)

The **IR** region belongs to thermal radiation, where the carriers of heat are the "radiators", and the visible region to the photons. Using the data of table 1 it is possible to determine the individual characteristics of a photon and a "teplotron", where they can participate together in any physical and chemical process.

III. CONCLUSION

The analysis carried out in the natural sciences makes it possible to draw a conclusion about the existence of elementary particles-carriers of heat - "teplotrons". The temperature that determines the degree of heating of the material object expresses the frequency of "pulsations" of "teplotrons", which characterizes the thermal state of the system and must be taken into account when developing innovative technologies in various fields of technology and energy conservation. In particular, the real notions of temperature and the microstructure of the "chemical individual" of the substance make it possible to obtain information about their structural and energy organization and will serve as the basis for the synthesis of new materials with specified properties. **It is shown**

that in the course of physicochemical processes, "combinations of elementary particles" can be formed, in particular, from "teploltrons", photons and electrons [14,15,21-24]. The new fundamental concepts that we published (the transfer of heat by "heat generators", the possibility of forming "combinations" of elementary particles, the causes of "pulsations" of microobjects, etc.) have a high potential for further development in order to use these provisions for developing breakthrough technologies aimed at creating new materials and Rational use of natural resources.

IV. REFERENCES

[1]. https://en.wikipedia.org/wiki/Temperature

[2]. Physics. Great Encyclopaedic Dictionary / Ch. Ed. A. M. Prokhorov. -M .: The Great Russian Encyclopedia, 1998. - P. 741. - 944 p. Russian

[3]. Zalewski K. Phenomenological and statistical thermodynamics: A short course of lectures / Transl. from Polish. under. ed. LA Serafimova .- Moscow: Mir, 1973. -168 p. Russian.

[4]. www.decoder.ru/list/all/topic_77/ Fundamental interactions of matter and energy. - Decoder.Ru

[5]. Sivukhin D.V. General course of physics. Thermodynamics and molecular physics, vol.2, M .: Nauka, 1990. - 591 p. Russian

[6]. Physical Chemistry / Ed. K.S. Krasnov .- M .: Higher School, 1982.-687p. Russian

[7]. Electronic resource. https://en.wikipedia.org/wiki/Theplorod. Russian

[8]. Soddy F. Matter and energy. Publishing house "Nature", Moscow, 1913, 182 p. Russian

[9]. Voyevodsky A. What is the temperature, pressure and sound in gases from the point of view of quantum mechanics? 314159.ru/voevodskiy/voevodskiy2.htm Russian

[10]. R. Kubo. Thermodynamics / Ed. Translation by DN Zubarev, NM Plakida. - Moscow: Mir, 1970.-304 p. Russian

[11]. Kvasnikov, Thermodynamics and Statistical Physics. T. 1, 2002, p. 11. Russian

[12]. Smorodinsky A. Temperature-M.: TERRA-Knizhnyy Klub, 2008.-224p. Russian

[13]. Utelbayev B, Suleimenov E, Utelbayeva A, Zhanabay N. Some Concepts about Substance, Chemical compound and an Element//American Chemical Science Journal. 2014.4 (2) PP.166-73

[14]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. The nature of the motion of elementary particles and the form of energy transfer// Science and World. International scientific journal.-2016.-No. 9 (37), Vol.1.-PP.32-35. Russian.

[15]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. Results of changes in the structural-energy correspondence in the structure of material objects// Science and world. 2016. No. 8 (36). Vol. I.,pp.12-16 Russian.

[16]. Yavorsky B.M. Seleznev Yu.A. Reference manual on physics for entering universities and for self-education. M .: Nauka.-Gl.red.fiz.-mat.lit., 1989.-576p. Russian.

[17]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. About the transfer of heat between material objects .// Science and World. 2015 vol.1 No.2. 18) p.39-43. Russian

[18]. Utelbayev BT, Suleimenov EN, Utelbayeva AB.. The Hypothesis about Heat Transfer and Nature of its Carrier // PONTE. Florence, Italy, International Scientific Researches Journal .Vol.72.No.2.Feb.2016, pp.18-25.

[19]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. Interconnection of heat and mass changes in the reacting substances at Physical and Chemical Transformations. // J. Chem.Bio. And Phy. Sci. April 2015; Vol.5, No.2; 1783-1790.

[20]. Utelbaev BT, Suleimenov EN, Utelbaeva AB Use of the fundamental Gibbs equations for calculating the mass and velocity of elementary particles-carriers of heat. // Science and World. International scientific journal. 2015.-v.1 №3 (19), p.45-49. Russian

[21]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. 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.

[22]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. 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.Issue 1: Page: 50-54.

[23]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. The Structure of "Chemical Individuals" and the Transfer of Heat // Ijsrm.Human.2017.Vol.6 (1) 53-62

[24]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. The Influence of External Impact in Transfer of the Energy between Material Objects. International Journal of Scientific Research in Science and Technology. Vol.2. Issue5, Print ISSN: 2395-6011.PP.241-245

[25]. https://en.wikipedia.org/wiki/The visible_radiation. Russian

[26]. https://en.wikipedia.org/wiki/Winter_Warning. Russian

[27]. Nikolis G., Prigogine I. Self-organization in nonequilibrium systems: From dissipative structures to ordering through fluctuations. M .: Mir, 1979, - 512p. Russian

[28]. Feynman, R. QED-a strange theory of light and matter / Trans. With angl.M.: AST, 2014.-194p Russian

[29]. A short reference book of physico-chemical magnitudes. L.: Chemistry.1983.-232p. Russian

[30]. Utelbayev BT, Suleimenov EN, Utelbayeva AB. Temperature is the Parameter of the Structural and Energy State of the System. International Journal of Scientific Research in Science and Technology.Vol.5.Issue6: Page No: 14-16, November -December 2016 ISSN (Online) 2278-5299.

[31]. Theory of Combustion and Explosion: A Textbook and a Workshop / O.G.Kazakov.//dr .]: under general. A.V. Totay. OG Kazakova-2 ed.-M .: Publishing House Yurayt, 2013.-295p. Russian.