STATISTICAL ANALYSIS OF ENTROPY

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Entropy is a measure of disequilibrium, ie disorder, which occurs in all natural phenomena: the physico-chemical, technological, biological, etc. Setting the degree of entropy generation and the self, the value of the energy loss, determine the way to reduce them. The biggest information entropy gives a method based on statistical physics.

The purpose of research - analysis of entropy from the perspective of statistical physics; bringing the functional dependence for the entropy: probabilistic, information, dynamical systems; outlining the basis of the entropy evolution and biological systems.

Materials and methods of research. Study of entropy as a measure of irreversibility actually occurring phenomena studied by R. Kauzusa, W. Thomson, L. Boltzmann, J. W. Gibbs et al., However, merit a comprehensive analysis of a number of issues specific to the entropy (the distribution function; Kolmogorov entropy; information entropy, the entropy evolution), from the standpoint of statistical physics.

The results of the study. The concept of entropy can be applied to the thermodynamic non-equilibrium states, if the deviation from thermodynamic equilibrium are small and can introduce the concept of local thermodynamic equilibrium in small but still macroscopic quantities. In general, the entropy of the system is the sum of the entropies of its parts in local equilibrium.

Thermodynamics of nonequilibrium processes allows to investigate in more detail the process of increasing entropy and calculate the amount of entropy

produced per unit time due to deviations from thermodynamic equilibrium.

For the first time the connection entropy to the probability of the system was established by Boltzmann. The evolution of a closed system is carried out in the direction of the most probable energy distribution over the individual subsystems. Statistical physics considers a particular class of processes - fluctuations at which the system becomes less likely position, and its entropy decreases. The presence of fluctuations shows that the law of entropy increase is only performed on average for a large period of time.

Entropy in statistical physics is closely related to information entropy, which is a measure of uncertainty messages.

As the driving force of evolution should be considered energy dissipation. Despite the increase in the level of organization and complexity of living systems, over time there is an acceleration of biological evolution - each new stage of functional organization is the germ of the future evolution.

The systems in question are highly organized, besides having a hierarchical structure. It is also characteristic of random variations, including evolution, which should be seen as a cascade of discrete episodes - bifurcations, each of which leads to a more complex or more abstract hierarchical level in this dynamic system.

The information generated not only a cascade of bifurcations leading to symmetry breaking, but successive iterations, leading to more subtle solution. It is these fluctuations on the merits and responsible for new information generated by evolving a hierarchical system.

Life is fundamentally linked to the hierarchical synthesis of accidents, and for each subsequent level of the hierarchy are synthesized by the conditions, other than conditions in the previous steps. As a result, the entropy, which describes the number of possible states of the system at the previous level in the hierarchy is added to the entropy created new conditions that govern the new conditions. Therefore, the origin of life and its evolution towards a more highly

organized forms is a hierarchical process to increase the total entropy. Hierarchy and synthesis of information is the evolution of life.

Conclusions

Entropy covers all aspects of the transformation of matter: the energy change, volume and chemical potential. Therefore, any system in nature, living or non-living, characterized by entropy. All phenomena are nonequilibrium, probability and consequence of this, they need to explore with the position of statistical physics.