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General concepts of the laws of thermodynamics

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Аннотация: В данной статье рассматриваются первый, второй и третий законы термодинамики. Дана информация об истории их появления и использования.Эта статья может быть использована исследователями и студентами.

Abstract: This article covers the first, second and third laws of thermodynamics. Information about the history of their appearance and use is given. This article can be used by researchers and students.

Ключевые слова: Первый закон, второй закон, третий закон термодинамики, энергетический баланс, классическая термодинамика.

Key words: First law, second law, third law of thermodynamics, energy balance, classical thermodynamics.

There is a department in the world that is responsible for the study of physical heat and the changes produced by heat in a system. We can learn about this section in thermodynamics and its laws. It is the branch of physics responsible for the study of all changes that result from processes involving changes in temperature and energy states at the macroscopic level. In these sections, we study the laws of thermodynamics.There are three laws of thermodynamics, the first of which is the first law of thermodynamics. This is one of the basic laws of science, and it expresses the general physical law of energy conservation for thermodynamic systems that must perform heat, mass transfer, and chemical processes.As a result, the conservation law is used in this, the first law in the form of the energy balance equation in flow thermodynamics and non-equilibrium thermodynamics. In equilibrium thermodynamics, the first law of thermodynamics is usually understood as a consequence of the law of conservation of energy.In the second law of thermodynamics, the sum of entropies of interacting systems in a natural thermodynamic process never decreases. As a result, the general meaning of this law is that heat does not spontaneously transfer from a colder body to a hotter body. The third law of thermodynamics shows that as the temperature of a system approaches absolute zero, its entropy approaches a constant value.As a result, there are exceptions for non-crystalline solids, but the entropy of a system with absolute zero is usually close to zero. These laws prevent the possibility of perpetual motion machines, the first law prohibits the production of work without the input of energy,

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and the second law prohibits the spontaneous conversion of thermal energy into mechanical work.The history of thermodynamics is closely related to the development of physics and chemistry and goes back to ancient theories about heat. Basically, the laws of thermodynamics were established as a result of the progress made in the 19th and early 20th centuries. Sadie Carnot's work in the 19th century established the second law, while scientists such as Rudolph Clausius and William Thomson formalized the first and second laws by the 1860s. Walter Nernst later developed what became known as the third law between 1906 and 1912. This was followed by proposals for additional laws, the four accepted laws of thermodynamics being the most recognized and discussed in standard textbooks.The first law of thermodynamics is often expressed as the impossibility of a perpetual motion machine of the first type that operates without energy from any source [1] [2] [3] . This law means that the transition from the microscopic description of the known system to the macroscopic description of the energy itself leads to a radical reduction in the number of physical quantities needed to describe the system.Therefore, in thermodynamics, the energy changes that occur at the micro level within the system are sometimes very complex, not detailed, but collectively described by the internal energy, which is a component of the total energy, a macroscopic quantity introduced specifically for this purpose.The result is a system that, from a microscopic point of view, is the sum of the energies of all the particles included in the system. Therefore, in textbooks that do not deal with flow thermodynamics and non-equilibrium thermodynamics, the first law is often formulated as a postulate that introduces the idea of internal energy as an additional quantity to the physics of macroscopic systems. For a single-valued, continuous and finite scalar function of the state of a thermodynamic system and any other state function, the change in internal energy U is the fully differential existing dU in an infinitesimal process and the change in internal energy in a circular process. If we analyze classical thermodynamics, we can see that it is based on the concept of a macroscopic system. This system is nothing more than a part of a physical or conceptual mass isolated from the external environment.To better study thermodynamic systems, we must always assume that it is a physical mass that is not disturbed by energy exchange with the external ecosystem.Chemical energy stored in molecules can be released as heat in the chemical reactions that occur when fuel methane, coal, or cooking gas is burned in air.Chemical energy can also be used to do mechanical work when fuel is burned in an engine, or to produce electricity through an electrolytic process. In addition, the cell is similar to dry cells. Thus, different types of energy are connected to each other and under certain conditions they can be transformed into other forms. The study of these changes is the focus of

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thermodynamics. The laws of thermodynamics cover energy changes in macroscopic systems with many molecules instead of microscopic systems with a handful of molecules. Thermodynamics is not concerned with how and how fast energy changes occur, but with the initial and final conditions of the system undergoing the changes. The laws of thermodynamics apply only to systems that are in equilibrium or moving between equilibrium and another equilibrium. Macroscopic properties such as temperature and pressure do not change with time in an equilibrium system.The state of the macroscopic system in equilibrium is determined by quantities called thermodynamic variables. We know all these variables and they are temperature, pressure, volume and chemical composition.All these variables are what define systems and their equilibrium. Due to the practical international union, the main symbols that exist in chemical thermodynamics have been established. It became possible to work with these units and explain the law of thermodynamics better. However, there is a branch of thermodynamics that does not study equilibrium, but is mainly responsible for the analysis of thermodynamic processes that are characteristic and do not have the ability to consistently reach equilibrium conditions. In conclusion, it can be said that the first principle of thermodynamics is the principle of conservation of energy. The amount of energy in a heat engine is converted to work and can be seen by any machine that produces work without consuming energy. We can establish this first principle as follows: in it, the change in the internal energy of a closed thermodynamic system is equal to the difference between the heat supplied to the system and the work done by the surrounding system.

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References:

1. Callen H. B.. Thermodynamics and an Introduction to Thermostatistics, 2nd ed, N. Y. e. a.: John Wiley, 1985.

2.Cohen E. R., Cvitaš T., Frey J. G. e. a.. Quantities, Units and Symbols in Physical Chemistry, 3rd ed, Cambridge: The Royal Society of Chemistry Publishing, 2007.

3.Kirchhoff Gustav. Vorlesungen über mathematische Physik. Band IV. Vorlesungen über die Theorie der Wärme. Leipzig: Verlag von B. J. Teubner, 1894.

4.Tisza Laszlo. Generalized Thermodynamics. Cambridge (Massachusetts) — London (England): The M.I.T. Press, 1966.

5.Александров А. А.. Термодинамические основы циклов теплоэнергетических установок. М.: Изд-во МЭИ, 2004.

6.Артемов А. В.. Физическая химия, Бакалавриат. М.: Академия, 2013.

7.Базаров И. П.. Термодинамика, 5-е изд, Учебники для вузов. Специальная литература, СПб.—М.—Краснодар: Лань, 2010. .

8.Беккер Р.. Теория теплоты. М.: Энергия, 1974.

9.Белоконь Н. И.. Термодинамика. М.: Госэнергоиздат, 1954.

10.Большая Советская Энциклопедия, 3-е изд, М.: Советская Энциклопедия, 1975. Архивная копия от 23 июня 2017 на Wayback Machine

11.Борн М. Критические замечания по поводу традиционного изложения термодинамики (рус.) // Развитие современной физики. — Отв. ред. Б. Г. Кузнецов. — М.: Наука, 1964. — 331 с. — С. 223—256.

12.Борщевский А. Я.. Физическая химия. Том 1 online. Общая и химическая термодинамика. М: Инфра-М, 2017. 13.Воронин Г. Ф.. Основы термодинамики. М.: Изд-во Моск. ун-та, 1987.

14.Второе начало термодинамики: Сади Карно — В. Томсон-Кельвин — Р. Клаузиус — Л. Больцман — М. Смолуховский. М.—Л.: Гостехиздат, 1934.