Review of: "Clausius' thermodynamics, the logical conclusion of the conceptual differentiation of caloric in terms of the two laws of thermodynamics"

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A large number of works have been written on the subject of the article. Each new work, including this one, contributes to the systematization of our knowledge in the field of thermodynamics. As for the article under review, it should be published in order to once again show the difficulties in the development of science and the dissatisfaction of scientists with the existing presentation of thermodynamics in general and the second law in particular.

1. In physics in general and in thermodynamics in particular, many terms are ambiguous: they denote both an objective reality (matter and its properties) that does not depend on human consciousness, and physical quantities (PQ), which are quantitative characteristics of these properties (mental models). Multiple-valued terms are energy, heat, work, etc. The term energy denotes both motion (a property of matter), and the physical quantity E - "amount of energy" (later the word "quantity" was removed). The term "heat" also denotes the movement, transmitted in a chaotic form, and the physical quantity Q - "the amount of heat" (this term is considered official, but the word "quantity" is often omitted). Let us consider the contexts from the reviewed article from these positions:
"Thermodynamics is the theory of energy resulted from the conceptual differentiation of**caloric**, circa 1850-1865, into **energy**, **entropy**, and **heat** (a disorganized form of energy) in terms of the two laws of thermodynamics, the first law and the second law";."… equilibrium thermodynamics was the result of a conceptual differentiation, explicitly, of **caloric** into **energy** and **entropy".**
Since caloric is commonly understood as a weightless fluid (carrier of heat), then all other terms in contexts must express real things, like heat is an unorganized form of energy. The question arises, what kind of objective reality should be understood by the term "entropy"? From the introduction of entropy by Clausius in 1865 to the present day, the best minds of mankind have been trying to answer this question. In this regard, based on the title of the article "Clausius' thermodynamics, the logical conclusion of the conceptual differentiation of caloric in terms of the two laws of thermodynamics", the logical transition from caloric to energy and entropy cannot be considered complete. In works [1, 2], a new concept is put forward – the "concept of non-equilibrium", which answers the question of what kind of objective reality is the physical quantity entropy a measure of.
2. The article under review contains a lot of material on the works of Clausius and Kelvin, and less on the work of Carnot and does not indicate the work of Clapeyron at all. Carnot described the individual processes of the cycle (Carnot cycle), but did not give a graphic representation of the cycle – it was given by Clapeyron (1834). It should not be overlooked that Carnot used the theory of caloric. Carnot believed that the work in the engine is done due to the flow of caloric, which,

flowing through the engine, does work like water rotating a water wheel. At the same time, the amount of fluid, as well as water, is conserved. Drawing an analogy between the heights of water fall and the temperature difference between hot and cold bodies, he formulates a theorem (Carnot's theorem): “The driving force of heat does not depend on the agents taken for its development; its amount is determined solely by the temperatures of the bodies, between which the caloric is ultimately transferred” [3].

3. The visibility and usefulness for the reader of block diagrams would be much higher if the date was indicated inside the boxes with the text. For example, Kelvin is absolute temperature, 1848.

1. Ryndin, V. V. Statement of the second law of thermodynamics on the basis of the postulate of nonequilibrium*Periodico Tche Quimica*, 2019, 16 (32), 698-712.

2. https://novapublishers.com/shop/advances-in-thermodynamics-research/ Joseph A. Cobb (Editor). Chapter 1. The Concept of Non-Equilibrium as the Basis of the Second Law of Thermodynamics (Vladimir Vitalievich Ryndin). New York, 2021. ISBN: 978-1-53619-856-0.

3. Golin G. M., Filonovich S. R. Classics of physical science (from ancient times to the beginning of the 20th century): Ref. Benefit. - M .: Higher. school, 1989. – 576 p. ISBN 5-06-000058-3