Qeios

Peer Review

Review of: "Energeia Physics: An Amendment to the Joule-Thomson-Maxwell Energy Narrative"

Andrew Das Arulsamy[1]

1. Independent researcher

This article contains interesting historical background on the development of thermodynamics and its two laws. The author then makes the connection as to how one could understand these laws based on energy and entropy by exposing the missed connection.

Apart from the historical introduction to thermodynamics, this paper is not presenting anything scientifically new to the extent that the claim made in (A) above is false, while the claim in (B) is just a worldview that changes with one's understanding of how one should view. You can view it as energy or based on Energeia Physics. These views do not change the false deduction made in (A) nor does the connection made in (B), which is how and why the 1^{st} and the 2^{nd} laws are connected but independent at the same time.

Below I give the reason(s) for the claim made in (C), which is sufficient to show why (A) is false.

The author claimed

(C) "*But insisting that every step of the narrative be an energy conversion step, including the starting step of the reversible transformation of a chemical mixture into a chemical product and work is a mistake.*" This statement is false, which is deduced from "*energy dissipation is 'by no means identical with' entropy growth.*"

The rest of the manuscript goes on to justify the correctness of the above statements. First, (C) is not a problem at all, except that (C) arises from fundamental confusion about thermodynamic laws. But never mind. This manuscript helped me to refresh my knowledge of the history of thermodynamics, which is well presented, I guess. I am not familiar with proper history, though, hence the phrase, 'I guess'.

Anyway, I apologize that I took slightly more than 1 week to compose this report, as the content in this manuscript did not warrant my urgent attention.

doi.org/10.32388/JQNGT1

There is nothing wrong with the word 'solely'. Replacing it with 'entirely' means the same thing in the context presented by the author.

The author fails to recognize that entropy does not and cannot exist (or cannot be defined) without the 1st law. The 2nd law is confined by the 1st law. I personally would claim that the 2nd law is protected by the 1st law.

The above two facts (1) and (2) prove that your statements (C) and claim [(A)] stated above have got to be false.

The author goes on to discuss the energy availability to perform work by correctly identifying that every step of the process needs energy to be used and transformed for both reversible and irreversible steps.

However, the author missed an essential point: Whenever entropy is used or derived from energy transformation, one automatically assumes all the required energy transformations have been considered. In other words, for that particular energy transformation, the 2nd and the 1st laws are always valid, which is correct. For any introduction of any additional processes (reversible or otherwise), they will still obey the two laws, always, and this is also correct.

The author claims (a1) “quantity of work a body can do.” and (b2) “preferred direction in the change for a body.” have not been synthesized as a complete story. This is true. In particular, (a1) and (b2) are what the thermodynamic state functions can tell us, independently, and the work and entropy quantities vary depending on the system's capacity to interact (determined by the interaction energy of the constituents). Having understood (a1) by means of interaction energy, we can then go on to talk about (b2), which is driven by process(es) with maximum or strongest interaction energy(ies). This maximum interaction energy(ies) determine(s) (b2).

The above synthesis of (a1) and (b2) has been made proper based on microscopic physics and theoretical chemistry in the following references. [Indian J Phys (June 2014) 88(6):609–620], [*J. Chem. Sci.* Vol. 126, No. 3, May 2014, pp. 677–689.], [*J. Chem. Sci.* Vol. 125, No. 5, September 2013, pp. 1223–1235.] and [Results in Optics 15 (2024) 100638].

I am very well aware that I am citing only my own references above, but then, I am also not aware of any other groups who have worked out the details on (a1) and (b2) either. I am not asking you or anyone to cite my work (in fact, I never do that). These citations are for your information so that you know exactly where to look for the details on the comments made here, and why I said what I said.

In conclusion, the author has observed an interesting point to derive the differences between (a1) and (b2), which I did not (from the above references), using entirely the thermodynamic state functions and derivations, but with some false misunderstanding originating from (A), (C) (1) and (2) as the author's guidance. Given the above exposition and comments, the author's Section 4 is redundant, and we do not need more classical concepts to classify and verify something that has been verified properly microscopically as reported in the above-listed references.

I guess it can be published in Qeios at least for correctly pointing out the existence of (a1) and (b2) and their connections based on thermodynamic laws. I am not sure how Section 4 can be used to calculate something useful in chemical thermodynamics. If the author could give examples of such applications, then this would raise the standard of this manuscript many-fold.

Declarations

Potential competing interests: No potential competing interests to declare.