DISCUSSIONS

A Comment on the Paper “Systems with Variable Energy, Volume and Number of Particles: Evaluation of Partition Function and Thermodynamic Quantities” by I.M. Stanković, V.M. Marković, and Lj.Z. Kolar-Anić [1]¹

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Received April 7, 2013

DOI: 10.1134/S0036024413120327

The statistical-mechanical Ensemble for a fully open system (generalized Ensemble (gE) for short) discussed in the paper commented upon [1] was proposed by Guggenheim over seventy years ago [2], and discussed in detail by Prigogine and other authors as well (see, e.g., [3–6]); already in [2] it was pointed out that a generalized partition function for a single-component system *only* depending on intensive quantities (T , P , μ) has some “special” character: actually, by thermodynamics, μ is a function of (T , P) via Gibbs–Duhem equation, i.e.,

$$Nd\mu = -SdT + VdP,$$

where N denotes the number of moles, V and S denote volume and entropy, respectively; the expression for $\mu(T, P)$ of an ideal monoatomic gas is a standard result in Statistical Thermodynamics [4, 6]. This aspect seems to have been overlooked in the paper commented upon [1].

The treatment of the named gE was related to, and partly intertwined with, another issue, i.e., a proper theoretical construction of the isothermal–isobaric Ensemble [2, 4, 5] (see also [6] and earlier ones quoted therein); early examples of actual calculations based on the gE are quoted in [6]; it was also discussed or

used for calculations in more recent years (see, e.g., [7–10]). Notice also that a detailed treatment of the named gE was carried out by Hill in [4], and later quoted in his book on Statistical Thermodynamics [7].

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¹ The article is published in the original.