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DISCUSSIONS

Reply to the Comment by Silvano Romano [1] on the Paper [2][1]

I. M. Stanković, V. M. Marković, and Lj. Z. Kolar-Anić

Faculty of Physical Chemistry, University of Belgrade, Studentski trg 12-16, 11158 Belgrade, P.O. Box 47, Serbia

e-mail: stankoviciv@gmail.com, wladimirmarkowic@gmail.com, ljiljana.kolar.anic@gmail.com

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It is true that this totally open ensemble (which is not-generalized ensemble) had already been discussed in the literature, but never with this specific derivation. This derivation is direct, it starts from the discussion of N, V, E reservoirs, thus being especially suitable for physicochemists. Our paper also contains a suitable table of partition sums and thermodynamic potentials.

Our results coincide with that given in the literature [3]. Starting from the grand canonical ensemble, we can derive the statistical sum of a totally open system using the second postulate of statistical thermodynamics [3]:

$$\Pi(T,P,\mu) = \sum_j \Xi(T,V,\mu)\exp\left(\frac{-PV_j}{k_\mathrm{B}T}\right),$$

where Π is the totally open partition sum and Ξ the grand canonical partition sum:

$$\Xi(T,V,\mu) = \sum_i \sum_k \exp\left(\frac{\mu N_k - E_i}{k_\mathrm{B}T}\right).$$

Thus, the statistical sum of a totally open system is:

$$\Pi(T,P,\mu) = \sum_i \sum_j \sum_k \exp\left(\frac{\mu N_k - E_i - PV_j}{k_\mathrm{B}T}\right),$$

and if considering the degeneration or statistical weight, the previous term becomes:

$$\Pi(T,P,\mu) = \sum_i \sum_j \sum_k g(E_i, V_j, N_k) \times \exp\left(\frac{\mu N_k - E_i - PV_j}{k_\mathrm{B}T}\right).$$

[1] The article is published in the original.

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