

Abstract Submitted
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On the Consequences of Clausius-Duhem Inequality for Electrolyte Solutions¹ MARTINA REIS, ADALBERTO BONO MAURIZIO SACCHI BASSI, University of Campinas- UNICAMP, Campinas, Brazil — Based on the fundamentals of thermo-statics, non-equilibrium thermodynamics theories frequently employ an entropy inequality, where the entropy flux is collinear to the heat flux, and the entropy supply is proportional to the energy supply. Although this assumption is suitable for many material bodies, e.g. heat-conducting viscous fluids, there is a class of materials for which these assumptions are not valid. By assuming that the entropy flux and the entropy supply are constitutive quantities, in this work it is demonstrated that the entropy flux for a reacting ionic mixture of non-volatile solutes presents a non-collinear term due to the diffusive fluxes. The consequences of the collinearity between the entropy flux and the heat flux, as well as the proportionality of the entropy supply and the energy supply on the stability of chemical systems are also investigated. Furthermore, by considering an electrolyte solution of non-volatile solutes in phase equilibrium with water vapor, and the constitutive nature of the entropy flux, the stability of a vapor-electrolyte solution interface is studied. Despite this work only deals with electrolyte solutions, the results presented can be easily extended to more complex chemical reacting systems.

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