23rd European Conference on Thermophysical Properties
June 21 to 24, 2026
Serge Kampf les Fontaines Castle, FRANCE
www.ectp2026.com

The Li_2CO_3–Na_2CO_3–K_2CO_3 Molten Eutectic. Challenges and Gaps in Thermophysical Property Data

Valentim Nunes[1,4,*], João Chainho[1,2], Pedro Rodrigues[3], Maria José Lourenço[1,2] and Carlos Nieto de Castro[1,2,*]

[1] Lab. Extreme Systems and Environments, Centro de Química Estrutural, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal
[2] Departamento de Química e Bioquímica, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal
[3] Instituto D. Luís and Departamento de Geologia, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa, Portugal
[4] Centro de Investigação em Cidades Inteligentes, Instituto Politécnico de Tomar, Campus da Quinta do Contador, 2300-313 Tomar, Portugal

*Corresponding Author: cacastro@ciencias.ulisboa.pt; valentim@ipt.pt

This work revisits the Li_2CO_3 - Na_2CO_3 - K_2CO_3 eutectic through a critical assessment of the literature from its reported melting point at 397 °C (670 K) up to approximately 1200 K. Using a methodology inspired by IUPAC-supported strategies previously applied to common liquids such as water and hydrocarbons, we examine the quantity, quality, and coherence of existing measurements. Reference correlations are proposed only where the data are sufficiently robust to justify them. The analysis highlights a pressing need for more accurate and comprehensive measurements—particularly for heat capacity, thermal conductivity, and viscosity—to enable the development of reliable standard reference correlations.

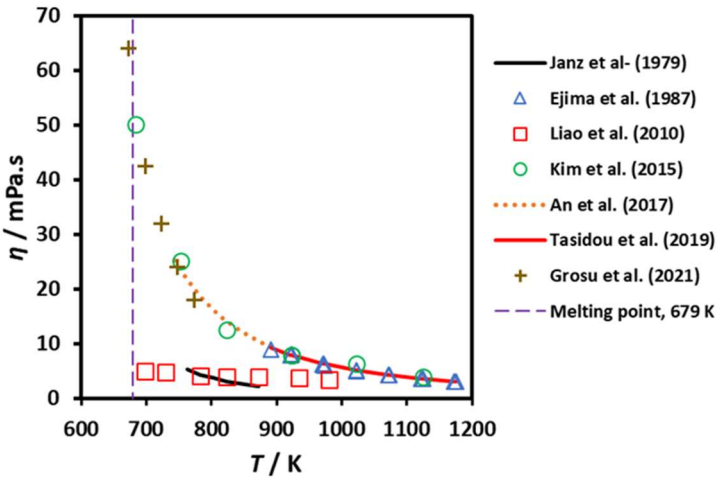


Figure 1. Viscosity of the ternary eutectic $(LiNaK)_2CO_3$. Lines are equations given by the authors. The points from Liao et al. (2010) and Grosu et al. (2021) were estimated from the available plot.

Acknowledgment

This work was partially funded by Fundação para a Ciência e Tecnologia, Portugal, through Projects UID/QUI/00100/2019, UIDB/00100/2020, UID/00100/2025 and UID/PRR/100/2025 of Centro de Química Estrutural, and Project NEWS4CSP, 2022.05021.PTDC.

Significant references

1. V.M.B. Nunes, M.J.V. Lourenço, F.J.V. Santos, C.A. Nieto de Castro, C.A, *Applied Energy*, vol. 242 (2019), pp. 1626-1633.
2. 2. A.R. Starke, J.M. Cardemil, V.R.B. Bonini, R. Escobar, M. Castro-Quijada, A. Videla, *Applied Energy*, vol. 359 (2024), 122689.
3. K.A. Tasidou, J.M. Magnusson, T. Munro, M.J. Assael, *J. Phys. Chem. Ref. Data*, vol. 48 (2019), 043102.