

Comprehensive Analysis of Troponone Nanoformulations: Characterization and Assessment of Antioxidant Activity

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Tropolone, a naturally occurring compound known for its potent antioxidant properties, holds significant therapeutic potential. However, its practical application is limited by challenges such as low solubility and thermal instability, particularly due to its low boiling point (80–84°C), which can lead to degradation during processing.

This study addresses these challenges by developing and formulating two lipid-based nanocarriers: nanoemulsions (NE-Trop) and nanostructured lipid carriers (NLC-Trop). These formulations aim to enhance the delivery and stability of tropolone. The results indicate a notable improvement in stability and antioxidant activity.

Using a high-pressure homogenizer during the nanoformulation process, we ensured uniform particle size and stability, employing temperature control to minimize thermal degradation. Characterization of the formulations revealed particle sizes ranging from 50 nm to 80 nm, demonstrating suitable stability for pharmaceutical applications. Additional assessments of rheological properties and surface tension further validated formulation stability.

The nanoformulations were comprehensively characterized in terms of physicochemical properties, stability, encapsulation efficiency, and antioxidant activity. Our findings highlight a significant enhancement in stability while maintaining its antioxidant potential. This suggests that tropolone-loaded nanocarriers are promising candidates for pharmaceutical applications where enhanced antioxidant properties are essential.

Keywords: tropolone, nanoemulsion, nanostructured lipid carrier, antioxidant activity

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References

- [1] Araújo GD, Loureiro AI, Rodrigues JL, Barros PA, Halicki PC, Ramos DF, Marinho MA, Vaiss DP, Vaz GR, Yurgel VC, Bidone J. Toward a Platform for the Treatment of Burns: An Assessment of Nanoemulsions vs. Nanostructured Lipid Carriers Loaded with Curcumin. *Biomedicines*. 2023 Dec 18;11(12):3348.
- [2] Al Subeh ZY, Pierre HC, Bockbrader RH, Tokarski II RJ, Maldonado AC, Haughan MA, Rangel-Grimaldo ME, Pearce CJ, Burdette JE, Fuchs JR, Oberlies NH. Semisynthetic derivatives of the fungal metabolite eupenifeldin via targeting the tropolone hydroxy groups. *Bioorganic & Medicinal Chemistry Letters*. 2024 Sep 15;110:129875.