10th Brazilian Conference on Natural Products
XXXVI RESEM
4-7 November 2025, Belo Horizonte, MG, Brazil

Section: 02

ETHANOL/NaOH BIPHASIC SYSTEMS: A SUSTAINABLE APPROACH FOR BIOCOSMETIC FORMULATION

Samuel Leite Cardoso[*1], Artur Borges Fiuza Arantes[1], Patrícia Marques Rodrigues[1], Joel Abreu[1], Ana Luisa Leoncio Rodrigues[1], Guilherme Martins Gelfuso[2], Yris Maria Fonseca-Bazzo[1], Damaris Silveira[1], Perola de Oliveira Magalhães[1]

Samuca93@gmail.com

[1]*Natural Products Laboratory, University of Brasilia, Brasilia, zip code 70910-900, Brazil.*
[2] *Laboratory of Food, Drugs, and Cosmetics, University of Brasilia, Brasilia, zip code 70910-900, Brazil*

Biphasic systems (TPS) represent a sustainable alternative for the separation and purification of biomolecules, reducing the need for toxic organic solvents. In this study, we investigated a TPS composed of ethanol and sodium hydroxide (NaOH), an inorganic salt, highlighting its viability as a green technology. Ethanol, a biodegradable and low-toxicity solvent, minimizes environmental impacts and makes the system economically viable. We evaluated the partition efficiency of secondary metabolites from the ethanolic extract of *Morus nigra* L. leaves, rich in antioxidants, aiming at the direct formulation of a topical gel with anti-inflammatory activity. The results demonstrated high selectivity and recovery of bioactive metabolites in the salt-rich phase, with a reduction in the chlorophyll present in the extract, indicating that the ethanol-NaOH combination may be a promising platform for sustainable pharmaceutical formulations, in line with the principles of green chemistry. The chemical marker neochlorogenic acid present in the ethanolic extract of *M. nigra* L. leaves confirmed the partition of polar metabolites preferentially to the salt phase (NaOH), with the quantification of this marker by HPLC. The antioxidant and depigmenting activities of the extract were determined using the DPPH free radical scavenging assay and tyrosinase enzyme inhibition. The extract exhibited high antioxidant capacity, and inhibited greater than 90% of tyrosinase activity at concentrations above 10.81 µg/mL. Cytotoxicity was evaluated using the MTT cell viability assay, yielding IC50 values of 800 µg/mL for L929 cells and 224.3 µg/mL for B16F10 cells, indicating low cellular toxicity and reinforcing the potential of the methanol-water biphasic system for obtaining bioactive compounds for sustainable cosmetic formulations.

Keywords: *Biphasic systems; biopharmaceutical; secondary metabolites*