

SURFACTANT-ASSISTED EXTRACTION OF BIOACTIVE COMPOUNDS FROM TURMERIC (*Curcuma longa* L.)

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Abstract

Turmeric, the dry rhizome of *Curcuma longa* L., is valued for its biological properties (e.g., antioxidant, antimicrobial, anti-inflammatory). These are mainly attributed to a group of secondary metabolites, namely curcuminoids, the most distinctive of which is curcumin. Due to their hydrophobic nature, curcuminoids are usually isolated using organic solvents, such as hexane, acetone, methanol, etc. However, due to increasing consumer demand for organic-solvent-free products, strategies for the aqueous extraction of polyphenols have gained new attention.

To this respect, the aim of the present study was the optimization of curcuminoids extraction from turmeric powder using aqueous, surfactant-based mixtures, combined with ethanol, as extraction solvents. The recovery was optimized through response surface methodology (RSM) using a central composite design (CCD). Solid-liquid extractions were performed through stirring and mild heating ($T \leq 30$ °C), while Polysorbate 80 (non-ionic) was used as the surfactant. The independent factors tested were the extraction duration (min), the ethanol concentration (% v/v) and the surfactant concentration in the solvent (% w/v). Total phenolic content (Folin-Ciocalteu assay), antioxidant activity (DPPH radical scavenging activity assay) and curcumin concentration (UV - Vis standard curve 0.75 – 6 ppm) were determined in the extracts (responses). In optimized conditions, extractions were performed with other surfactant types (anionic, cationic, amphoteric) and pure ethanol, for comparison purposes. All the optimized extracts were further analysed with HPLC (curcumin standard curve 0.5 – 50 ppm) for the quantitative determination of curcumin and other curcuminoids.

Based on the results, the optimized extraction conditions were determined at 59 min, 29% v/v ethanol and 5% w/v surfactant. Curcumin concentration in the extracts was affected by the surfactant type and concentration (% w/v). Surfactant-based solvents yielded higher curcuminoids content compared to ethanol. The present study highlights the potential of surfactant-based extraction of curcuminoids and their possible future applications in nutraceutical or cosmeceutical formulations.