

SUPERCRITICAL CARBON DIOXIDE EXTRACTION OF *Chelidonium majus* BIOACTIVE EXTRACTS USING BASIFIED CO-SOLVENTS

Nicolás A. Gañán^(1,2), Fernanda Bombaldi⁽¹⁾, Ana M. A. Dias⁽¹⁾, Julio Zygodlo⁽³⁾,
Esteban Brignole⁽²⁾, Hermínio C. de Sousa^{(1)*} and Mara E.M. Braga⁽¹⁾

(1) CIEPQPF, Chemical Engineering Department, FCTUC University of Coimbra
Rua Sílvio Lima, Pólo II-Pinhal de Marrocos, 3030-790, Coimbra, PORTUGAL

(2) Planta Piloto de Ingeniería Química (PLAPIQUI- CONICET)
Universidad Nacional del Sur
CC 717-8000, Bahía Blanca, ARGENTINA

(3) Instituto Multidisciplinario de Biología Vegetal (IMBiV- CONICET)
FCEfyN, Universidad Nacional de Córdoba
Avenida Vélez Sarsfield 1611, X5016GCA Córdoba, ARGENTINA

Chelidonium majus (“great celandine”) extracts contain a great number of isoquinoline alkaloids which are reported to be responsible for their well-known anti-inflammatory, antimicrobial and cytotoxic activities. In this work, the supercritical carbon dioxide (scCO₂) extraction of *C. majus* aerial parts and roots was performed in a two-step process: a first extraction step with pure scCO₂ followed by a second extraction step using scCO₂ and an alcohol-basified co-solvent (ethanol or isopropanol). Diethylamine was employed for alcohol co-solvent basification. Extraction kinetics and extraction total yields were studied at different pressure and temperature conditions by changing the solvent density from 0.3 up to 0.9 g/cm³. The use of alcohol-basified co-solvent increased the extraction yields from less than 1% up to around 5% wt. (dry basis). Extraction kinetic parameters were fitted for all experimental conditions using a three straight lines model. Collected extracts were characterized by gas chromatography-mass spectrometry (GC-MS) and by liquid chromatography (HPLC). Antioxidant activities were determined based on the coupled oxidation of β -carotene/linolenic acid system. Extracts anti-inflammatory activities were measured by the determination of their inhibitory effect on lipoxygenase. Results showed that higher SFE extraction yields were obtained for the higher scCO₂ densities (0.61 and 0.88%, dry basis). Extracts obtained at these conditions also presented higher lipoxygenase inhibitions which may indicate that the employed extraction conditions favored the extraction of compounds having higher anti-inflammatory activities.

Keywords: *Chelidonium majus*, supercritical carbon dioxide extraction, alcohol-basified co-solvents, antioxidant and anti-inflammatory activities.

*Corresponding author: hsousa@eq.uc.pt