

Formulation and characterization of O/W emulsions stabilized using eco-friendly aqueous extract from olive pomace

Abstract

Olive pomace (OP) valorization using aqueous extraction of bioactive compounds provide a potential tool to develop a sustainable process with minimum impact on health and the environment. The effect of different preparation and stress conditions on the emulsifying performance of crude aqueous extracts from untreated OP was investigated. OP aqueous extract contained important concentrations of surface-active compounds including proteins, saponins and polyphenols (1.65 ± 0.11 %, 6.43 ± 0.20 % and 3.23 ± 0.11 % (w/w), respectively) and reduced the interfacial tension by 43 % at the oil–water interface. The emulsions prepared using OP aqueous extract were stable for 30 days at 5 °C. Optimal interfacial tension reduction (10.9 ± 0.4 mN m⁻¹) along with minimal droplet size (590 nm) were obtained when using aqueous phases containing 1 % (w/w) OP extract and a homogenization pressure of 150 MPa. The emulsions were stable at pH values ranging from 3 to 6 and had a small particle size despite the reduced surface charge of the droplets indicating the possible involvement of a second stabilization mechanism such as steric repulsion. They were sensitive, however, to NaCl addition, heating and freezing. The present work suggests a novel approach for using water as a safe, green, and ecological alternative to harmful organic solvents to extract surface-active compounds from olive pomace.

Keywords: olive pomace, aqueous extraction, surface-active, oil-in-water emulsion, emulsion stability