

Abstract

Saponins are naturally occurring, structurally diverse, surface-active glycosides produced by plants, marine animals and bacteria with many traditional and industrial applications in the food, pharmaceutical and healthcare industries because of the compounds' naturally foaming and emulsifying properties. Grape pomace is a common solid by-product of the wine production industry. The objective of this work is to fill in the gap in present day literature on the properties of saponins found in grape pomace, specifically the extraction process, yield, and micellar properties from Mourvèdre grape pomace. The first part of this study verified the existence of saponins in grape pomace qualitatively using the Liebermann Burchardt color change test and thin layer chromatography. Next, the saponins were extracted from ground grape pomace with organic solvents to yield 19.7% and 17.8% of grape saponins using batch and continuous extraction processes, respectively. Dye solubilization tests confirmed that the extracted product from grape pomace exhibits behavior of a surfactant due to the formation of micelles at the critical micelle concentration of 0.9 g/L. Lastly, the mass-transfer coefficient for both a single particle and for the laboratory set up for continuous extraction was calculated to be 1.68×10^{-5} and 1.44×10^{-5} m/s, respectively. A theoretical mass transfer model for extraction was developed and computationally solved using COMSOL Multiphysics, in order to further study the extraction behavior of saponins from spherical grape particles and complex multiparticle systems.