

Preparation And Characterization of Grapeseed Oil-Based Emulsion Containing Vitamin C

Umami-Maisarra Abdul Hadi^a, Nursyamsyila Mat Hadzir^{ab*}

Structured Abstract

Background: Grapeseed oil is known for its antioxidant and anti-inflammatory properties which serves as an excellent ingredient for anti-acne and anti-aging products in cosmetic industry. In addition to that, Vitamin C is also one of the most common active ingredients in cosmetics. However, it is impossible to use vitamin C in its stable free form without a carrier such as emulsion system. Emulsion is a mixture of two or more immiscible liquids, for instance water and oil. Therefore, grapeseed oil can be used as the oil phase of the emulsions although they are thermodynamically unstable, hence surfactants are needed to stabilize the system. Therefore, this study was proposed to prepare and characterize a stable grapeseed oil-based emulsion as carrier for vitamin C.

Methods: The grapeseed oil was tested for moisture content and free fatty acid value. The stability of the emulsion was determined by preparing two formulations using two different ratios of oil: water: surfactant which are 28:57:15 (Formulation 1) and 40:40:20 (Formulation 2) by incorporating xanthan gum into the formulations using low shear homogenization method. Consequently, the more stable formulation was subjected to high shear homogenization method and characterization by determining its particle size, polydispersity index, pH, surface charge and electrical conductivity.

Results: The physicochemical properties of grapeseed oil showed high moisture content (0.6069 %) and low amount of free fatty acid (0.0997 %). Formulation 1 showed physical stability after the centrifugation test and Freeze-thaw cycle whereas Formulation 2 showed physical instability. Formulation 1 was then tested for particle size analysis with size of 1261 nm (low shear homogenization) and 117.9 nm (under high shear homogenization). The surface charge of the Formulation 1 was found to be -35.7 mV at pH 3.58 at day 1 that indicates a sign of a stable emulsion which able to withstand any physical instability. Only a small potential of electrical conductivity with a value of 0.00209 $\mu\text{S}/\text{cm}$ is recorded on the surface of Formulation 1's particle which indicates the dispersion medium is oil and this system is water-in-oil emulsion.

Conclusion: An acidic water-in-grapeseed oil emulsion with nano-size range particle and excellent stability was successfully prepared and characterized.

Keywords: Emulsion, Vitamin C, Grapeseed oil

*Correspondence: nursyamsyila@uitm.edu.my

^aSchool of Chemistry and Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

^bMultifunctional Porous and Nanostructured Materials (MULNA), Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia.