

## Preparation and Characterization of Sunflower Oil-Based Emulsion Containing Vitamin E

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### Structured Abstract

**Background:** Vitamin E is known as antioxidant which inhibit the propagation of free radicals in preventing the various diseases associated with presence of free radicals. The stability of vitamin E has effects in lowering the bioactivity, and as Vitamin E is easily oxidized, it gives a negative impact on its efficacy. Sunflower oil contains oleic acid and linoleic acid which are associated with health benefits and can be used as the oil phase for the emulsion system to enhance the delivery of Vitamin E. However, emulsion is an unstable system as the liquids are immiscible and able to agglomerate. Thus, the present study was proposed to prepare and characterize a stable sunflower oil-based emulsion containing vitamin E.

**Methods:** The sunflower oil was tested for its moisture content and free fatty acid value followed by investigation on the effect of different compositions of surfactants and oil phase on emulsion's stability by preparing Formulation 1 and Formulation 2 using two different ratios of oil: water: surfactant which are 28:57:15 and 40:40:20, respectively, with the incorporation of xanthan gum 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 sunflower oil showed high moisture content (0.5833%) and low free fatty acid value (0.0997%). Formulation 1 was found to be more stable during the centrifugation test and freeze-thaw cycle as compared to Formulation 2. Further analysis was conducted on Formulation 1, where the particle size measured was found to be 363.6 nm prepared via low shear homogenization method and 292.5 nm when prepared via high shear homogenization method. The polydispersity index value of 0.652 and zeta potential value of -37.4 mV indicates the stability of the emulsion. The differences between pH value on day 1 (3.33) and day 35 (3.20) was insignificant thus the emulsion can be considered as stable. The low electrical conductivity value (0.00162 mS/cm) indicated that the prepared emulsion was water-in-oil (W/O) emulsion.

**Conclusion:** A stable sunflower oil-based emulsion containing vitamin E was successfully prepared and characterized.

**Keywords:** Sunflower oil, Vitamin E, Emulsion.

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