

# **Beta-Carotene Microemulsion: Preparation, Characterisation & Stability**

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Microemulsion is a clear, low viscosity and thermodynamically stable emulsion with an average particle size of 20 – 500 nm. Currently, there is growing interest in the oil in water (O/W) microemulsion technology as the route to introduce lipophilic food ingredients such as oil soluble vitamins, carotenoids and flavour compounds into food system. This is because many food products are designed to be water based due to the fact that water is the most common medium in food. Therefore, O/W microemulsion system is beneficial to food industries because of its abovementioned superior quality. In this study, microemulsion is formulated using R(+)-limonene, a citrus essential oil, as the disperse phase, a mixture of MilliQ water and propylene glycol as the continuous phase and a blend of Tween 80 and Span 80 as the surfactant. Pseudoternary phase diagrams are constructed to evaluate the phase behaviours for various microemulsion systems with different ratios of surfactant mixtures. Visual observation and polarising light microscopy are used to identify the microemulsion, liquid crystal, gel, coarse emulsions and 2-phase regions. The properties of the microemulsion, namely particle size, electro-chemical properties, relative surface tension and rheological behaviour are investigated. The stability of the microemulsion is accessed visually and spectrophotometrically at different conditions for 60 days. It is found that the formulated  $\beta$ -carotene microemulsion has an average particle size of  $138.11 \pm 11.1$  nm and exhibit Newtonian flow behaviour. Furthermore, this formulation is able to retain more than 86% of  $\beta$ -carotene from initial amount uncovered at 21°C for 60 days. While storing the microemulsion in dark and sealed at 4°C and 21°C, less than 12% of  $\beta$ -carotene loss is accounted after 60 days. Microemulsion sample proved to have excellent protection against light and oxidative damages.