

OP15. Microemulsions of essential oils—an improvement of solubility or something more?

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The direct application of essential oils in an aqueous solution is significantly hampered by the limited solubility in the aqueous environment and the volatile nature of these mixtures. Colloidal systems in the form of microemulsions and nanoemulsions [1] can effectively disperse essential oils in water, what is needed in many biological tests and applications.

The aim of this work was to prepare stable, water-dilutable, microemulsions containing essential oils of citronella (*Cymbopogon nardus*), mint (*Mentha x piperita* ‘Multimentha’) and eucalyptus (*Eucalyptus globulus*) essential oils (EO) and the mixture of their equal parts. The possible antioxidant and antimicrobial applications of the obtained formulations were tested.

Nine runs were made in which the aqueous phase, being a mixture of water and polypropylene glycol in a 1:1 volume ratio, ranged from 10 to 90%, v/v. The oily phase was a mixture of the essential oil and soybean oil in a volume ratio of 3:1. Polysorbate 80 with an oil phase in 5 different volume ratios varying from 5:1 to 9:1 was mixed in each series. The essential oils constituted from 0.8 to 11% of the microemulsions. The diameter of the obtained microemulsion droplets was measured using the direct light scattering technique.

Stable microemulsions were obtained in the range between 10 and 50% of the aqueous phase. They were fully dilutable with water. The measurement of the diameter of the droplets for the formulations comprising 50% of the aqueous phase and diluted 10 times with water showed that particles of the oil dispersed in water were in the range between 10 and 20 nm. The formulations showed an increase in the antioxidant activity compared to the controls, whereas their antimicrobial activity was not influenced.

References:

[1] McClements, D.J., 2012. *Soft Matter* 8, 1719–1729.

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