



## Solubility investigation of ether and ester essential oils in water using spectrometry and GC/MS

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**Background and objectives:** Essential oils (volatiles) are aromatic oily liquids prepared from different parts of plants and demonstrate various therapeutic and cosmetic properties. The dissolution of essential oils are not desirable in water, therefore the aim of this research was evaluation and selection the best co-solvents for increasing their solubility and bio availability. **Methods:** The solubility of six plants essential oils were investigated in presence of propylene glycol (PG), polyethylene glycol 300 (PEG), glycerin and ethanol as solvent and tween 80 or lecithin as co-solvent by observation and spectrophotometric assay. Chemical composition of the essential oils and supersaturated 50% ethanol (SSE) and 50% PG or PEG (SSP) solutions were analyzed by GC/MS, too. **Results:** Ester (*Lavandula dentata*, *Heracleum persicum* and, *Elettaria cardamomum*) essential oils showed the best solubility in ethanol and PG, respectively. Ether (*Foeniculum vulgare*, *Pimpinella anisum* and *Petroselinum crispum*) essential oils had the best solubility in ethanol and PEG, respectively. In ester class, mixture of ethanol/water was the best solvent according to solubility and total amounts of major compounds of the essential oils. In ether class, all samples had better solubility in mixtures of ethanol/water than PEG, but the amounts of total phenols or ethers in SSP of some samples were higher than SSE. Therefore selecting the best solvent for these class need more experiments. **Conclusion:** Selecting the solvent for essential oils changes their chemical composition; therefore the best solvent was different for various purposes.

**Keywords:** chemical composition, dissolution, ester volatile oil, ether volatile oil, photometry