



## Solubility investigation of ketone and phenol essential oils in water using spectrometry and GC/MS

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**Background and objectives:** Essential oils are used for their flavors and fragrances and their medicinal properties in food, cosmetic, agriculture and pharmaceutical industries. This study was focused on the selection of the best solvent(s) which would increase water solubility of ketone and phenol classes of essential oils. **Methods:** The solubility of six plants essential oils was investigated in presence of propylene glycol (PG), polyethylene glycol 300 (PEG), glycerin and ethanol as the solvent and tween 80 or lecithin as the 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:** Ketone essential oils (*Anethum graveolens*, *Mentha spicata* and *Salvia officinalis*) showed the best solubility in ethanol and PG, respectively. Phenol essential oils (*Zattaria multiflora*, *Syzygium aromaticum* and *Trachyspermum ammi*) had the best solubility in ethanol and PEG, respectively. In the ketone class, solubility of all samples in ethanol/water was greater than PG/water, but total ketones in SSP of samples with good solubility in PG were more than SSE. In the phenol class, all samples had better solubility in mixtures of ethanol/water than PEG, but the amounts of total phenols in SSP of some samples were higher than SSE. Therefore, selecting the best solvent for these classes 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, ketone volatile oil, phenol volatile oil, photometry