Optimisation of distillation of volatile compounds from citrus using Mexican lime oil as a model

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Abstract

Lime oil has therapeutic applications such as antiviral, antiseptic, astringent, aperitif, restorative and tonic properties. It is also beneficial to the immune system. The main aim of this research was to validate the accuracy and reliability of compound identification and to quantify the volatiles present in lime oil. The dilution technique and simultaneous distillation extraction (SDE), using Likens-Nickerson apparatus, were two techniques used to isolate volatiles from lime oil sample in this project. Gas chromatography-mass spectrometry was involved in identification and quantitation of the volatile constituents. The results obtained show that the amount of limonene is the highest amongst all volatiles extracted, thus it is the major volatile component. The other major components of lime oil were β-pinene, γ-terpinene, neral, α-pinene and sabinene. This results obtained suggest that SDE technique leads to poor recovery of polar and water-soluble, low boiling point compounds such as monoterpenes (limonene, β-pinene, α-terpinene, γ-terpinene, myrecene) and oxygenated monoterpenes (nerol, neral, geranial, 4-terpineol, α-terpineol) compared to the dilution technique. The direct temperature exposure associated with SDE leads to some changes in aroma profile of lime oil. These changes may be due to losses of volatiles and formation of new volatile compounds. Thermal degradation and interaction of reactive compounds may occur, leading to artefact formation. Some losses occur among low-boiling volatile compounds such as (bergaptene) during concentration steps.