

# RAMAN SPECTROSCOPY ASSOCIATED WITH CHEMOMETRICS FOR DETERMINING ORIGANUM OIL ADULTERATION

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## Abstract

Essential oils (EOs) are complex mixtures of volatile and semivolatile compounds (aldehydes, ketones, alcohols and esters) obtained usually by hydro-distillation from the dry or fresh plant material (seeds, leaves, stems, bark or wood) [1]. Most of the EOs are used in aroma therapy, plant protection (as pesticide), food industry (as food preservatives), perfume industry etc. Because of high demand, EOs are often counterfeited and the quality of EOs is usually controlled by gas chromatography.

The aim of this paper is to analyze *Origanum* oil and its counterfeits by Raman spectroscopy. As an adulterant sunflower oil was used. Adulterated essential oils contained 1, 2, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90 % of sunflower oil. Raman spectra of pure *Origanum* oil and its counterfeits were measured by Witec R300 system equipped with 532 nm laser. Visual inspection of raw spectra led to conclusion that band at 2851 cm<sup>-1</sup> is a marker for sunflower oil presence in *Origanum* oil. However, this band was obvious only when concentration of sunflower oil is higher than, or equal to 10% and could not be seen in lower concentration. In order to reveal presence of this band in lower concentration, region between 2800 and 3000 cm<sup>-1</sup> was subjected to derivatization and then smoothing. Results displayed that Raman spectroscopy in combination with mathematical transformation of spectra can reveal small concentration of unwanted adulterant in *Origanum* oil.

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## References:

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