

## ABSTRACT

M.Sc. Thesis

### IDENTIFICATION OF ADULTERANT OIL AND ITS RATIO IN ADULTERATED OLIVE OIL BY FTIR SPECTROSCOPY AND CHEMOMETRIC METHODS

Tülin TAŞ

Adnan Menderes University  
Graduate School of Natural and Applied Sciences  
Department of Chemistry

Supervisor: Prof. Dr. A. Ersin KARAGÖZLER

In this study, the FTIR spectrums of samples of pure olive oil and cotton oil, both obtained from oil producers, and samples of corn oil and sunflower seed oil bought from local markets, were recorded and the discrepancies in the spectrums, although very small, of different oil types were specifically noted.

Additionally, olive oil samples were deliberately adulterated by adding the aforementioned vegetable oils at different volume ratios. For each mixture 10 IR spectrums were recorded, and hence, a total of 190 IR spectrums were obtained. The digitalized data of spectrums were analyzed by principal component analysis (PCA) using SIMCA-P statistical package program. It was shown that the pure oils could be neatly classified by PCA. Furthermore, PCA modeling was a very effective approach to show whether olive oil was adulterated by other vegetable oils, provided that the volume ratio of adulterant was at least 10 %.

Pure oils and olive oil-vegetable oil mixtures were then analyzed to determine their densities, refractive indices and the values of saponification, iodine and peroxide. Graphs were drawn to see the relation between the adulterant oil ratio and the magnitude of measured quantities. Relations were linear in each case, with correlation coefficients greater than 0.99. Then, the possibilities of and conditions for detecting the type of adulterant oil by examining the direction and magnitudes of the slopes of the lines were disansed.

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#### **Key Words:**

Olive oil, adulteration, FTIR spectrometry, chemometry, pricipal component analysis