

## **Application of Photopyroelectric Techniques, Together with Classical Ones for Characterization of Some Vegetable Oils**

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The high accuracy photopyroelectric calorimetry, together with photopyroelectric (PPE) and optical spectroscopy, were used in order to obtain thermal and structural information of some vegetable oils. Hemp, rapeseed, and flax oils in fresh stage, and after exposure to microwave field, were investigated. The investigated oils are of increasing interest due to their bio-active components that confer biomedical qualities (especially the polyunsaturated fatty acids  $\omega$ -3 and  $\omega$ -6).

The room temperature values of the thermal parameters and the freezing temperature were measured by using the PPE calorimetry, and structural data were collected making use of PPE spectroscopy. Complementary classical methods, as photoluminescence, IR and GC, validated the PPE results.

The parameters derived by PPE calorimetry are all thermal static (specific heat) and dynamic (thermal conductivity, diffusivity and effusivity) parameters. The high accuracy of the results (precision and reproducibility better than 98%) allows for correlations of the behaviour of the thermal parameters with compositional changes.

During microwave exposure, some phenomena as compositional changes, oxidation processes, reduction of the quantity of chlorophyll, are indication for oil degradation. For ageing purposes, a special microwave power treatment unit (800 W, pulsed regime, 1sec./pulse, duty cycle 90 ) was designed.

The FTIR spectroscopy indicates a decrease of the unsaturated fatty acids concentration through the reduction of the  $3010\text{ cm}^{-1}$  and  $1652\text{ cm}^{-1}$  absorption bands with the increase of the irradiation time and the GC validates these results. The photoluminescence technique indicates a decrease of the chlorophyll quantity (up to 25%) during exposure.