Extraction of Olive Oil Assisted by Pulsed Electric Fields (PEF)

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**Abstract.**

In this paper a prototype for the extraction of Olive Oil Assisted by Pulsed Electric Fields (PEF) has been developed and its implementation in an industrial olive oil mill has been followed. In particular, the results of experimental tests carried out on this plant are shown. The aim was to analyze the real-scale process, in order to evaluate the differences between the studied case and the traditional process.

The impact of the use of pulsed electric field (PEF) technology on olive oil production has been evaluated both in terms of extraction yield and chemical parameters linked to the olive oil quality. Moreover, industrial feasibility, process variables, design, and operational parameters are evaluated for the industrial olive oil plant processing.

PEF prototype system used during the tests is a semiconductor based positive Marx Modulator design with state-off-the art semiconductor technology projected for operation with resistive and capacitive type loads, with almost square wave voltage repetitive pulses. Continuous treatment chambers is a DIN40 with three collinear electrode.

Experimental tests were carried out by treating the olive paste continuously with pulsed electric fields (electric field 1.5-20.0 kV/cm, frequency 5.0-25.0 Hz, pulse 2.0-20.0 µs and specific energy 0.4-1.7 kJ/kg) comparing them with tests without the use of electric fields.

No inherent problems with regard to the availability of the prototype was observed, showed a number of advantages, such as the ease of positioning and installation. Thus, the prototype was readily connected between the crusher and the malaxer machine in an industrial plant. The system, implemented on an industrial olive oil extraction plant, was flexible and technically feasible.

PEF treatment to the olive paste significantly increased the extraction yield, compared the control. In addition no significant differences were found on the legal parameters of the olive oil, while some differences on the phenolic and volatile component were found.