Influence of surrounding gas composition during clarification using a vertical disc stack centrifuge separator on the final quality of EVOO

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**Abstract.** The disc stack centrifuge separator (DSCS), used to clean the extra virgin olive oil (EVOO), is one of the main source of oxidation occurring during the extraction. It is due to the intimate contact between the oil and the environmental air-oxygen caused by the action of the high rotational speed of the disk stack inside the drum. Despite many studies highlighted the negative effect of the use of DSCS on stability, oxidation level, nutritional quality and the storage time, industrially valid solutions have not yet been proposed. In this study, a disc stack centrifuge separator prototype working under modified atmospheres (MA) was designed and modified by the Authors and two working conditions were tested: a. unsealed DSCS using O2=0 kPa, N2=95.00 kPa, CO2=0 kPa; b. sealed DSCS in air; O2=19.76 kPa, N2=74.86 kPa, CO2=0.028 kPa. The results obtained with MA separation were compared with those in standard conditions (c. unsealed DSCS in air; O2=19.76 kPa, N2=74.86 kPa, CO2= 0.028 kPa). The comparison of EVOO by treatments have been calculated and compared as relative variation percentage (RelVar%) for each quality parameters with respect to the standard condition, making in this way the treatments comparable with respect to each parameter. The results unravelled as there has been a prominent improvement of the oxidative state compared with control. The highest ranked treatment was related to the sealed DSCS, corresponding to lowest number of peroxide (4.67 mEq O2/kg), acidity levels (0.19%), and conjugated dienes (A232=1.19) and trienes (A270=0.08). The control treatment was characterized by a lower turbidity index, carotenoids and water content. As consumers are increasingly interested in the health properties of EVOO, companies are investigating new approaches to improve quality and this study provides for hints to design EVOO clarification systems.