



EFFECT OF COLD PLASMA ON CASEIN

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Introduction. In the context of food processing, microbiological safety is an important aspect. Non-thermal plasma or fourth state of matter (1), is being investigated for the decontamination of fruits, vegetables and packing (2,3). Proteins are essential dietary components which perform essential functions in organisms (nutrition, growth and reproduction), and they are one of the main sources to assimilate nitrogen for the human beings. Various foods containing protein are usually subjected to chemical treatments, heat or other conventional treatment processes, which can cause the deterioration of their nutrients. Up to date, there is insufficient knowledge of the effect of the energy plasma on food and proteins. Therefore, the aim of this study was to evaluate the Oxidation of Carbonyl Groups (OCG), present in casein (in dry) by the effect of the cold plasma, processed at different times (Tt).

Methods. A plasma Reactor with Dielectric Barrier Discharge is used to evaluate the oxidation of carbonyl groups in casein (99% purity) with different treatment times, Tt, (0 to 15 min). The measurement of oxidation was performed according to the method reported by Vourela et al., (4), with some modifications; the absorbance of the treated samples was read at 370 nm.

Results. The results showed that the initial carbonyl groups in casein, 13.60 ± 2.24 nanomoles of carbonyl groups per mg of protein, underwent an oxidation after the sample was treated with cold plasma. The oxidation carbonyl groups were of 11.08 ± 2.16 nanomoles of carbonyl groups per mg of protein (81.47%), with a statistically significant difference ($p < 0.05$). The main oxidation of carbonyl groups occurred after the three minutes of treatment (Fig. 1). An exponential model for the oxidation kinetic is proposed:

$$OCG = 46.73(Tt + 2.5)^{-1.3}$$

The free radicals and the ultraviolet light present in the cold plasma could affect the Oxidation of Carbonyl Groups.

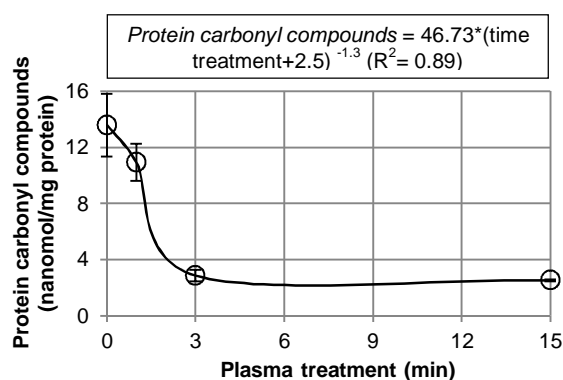


Fig. 1. Oxidation kinetics of carbonyl groups in casein at different times of plasma treatments.

Conclusions. An oxidation of 11.08 ± 2.16 nmoles of carbonyl groups / mg of protein is obtained after 15 minutes of treatment. These results suggest that this technology can be used for the treatment of finished products, since the outer portion of the proteins contained in food is oxidized.

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