

Effectiveness of Dimethylpolysiloxane during Deep-Frying

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Abstract

The positive effect of dimethylpolysiloxane (DMPS) on oil degradation in the frying process has been attributed either to its direct antioxidative action at high temperature or to the formation of a monolayer on the oil surface impeding the solubilization of oxygen. According to the second possibility, the DMPS action could be related to the inhibition of the convection currents created due to the existence of a temperature gradient in the oil. Independently of which its main action could be, it has been generally found lower oil degradation when DMPS was added to frying oils at very low concentrations (1 – 5 mg/Kg) as compared to the controls without DMPS.

In this lecture, results from many experiments are presented to define the effects of DMPS. First, thermoxidation assays were performed by heating different oils at frying temperatures either in oven or in plates. It was demonstrated that the positive action of DMPS took place only in oils heated in plates, where there was a temperature gradient as it normally occurs in the fryers. On the other hand, comparative assays of discontinuous and continuous laboratory frying of potatoes were performed to elucidate the highly variable action of DMPS reported in different studies. The results obtained on oils of different degree of unsaturation, i.e., mono and polyunsaturated oils, consistently demonstrated that a significant positive action of DMPS addition was found in discontinuous frying while results on oil degradation were similar in continuous frying operations. Conclusions were based on polar compound analyses, and on residual values of oxidative stability and remaining levels of natural antioxidants determined in oils after the different assays.

The main conclusions would indicate that, first, a gradient temperature is necessary to detect the effectiveness of DMPS on oil degradation and, second, that the positive action of DMPS during discontinuous frying was exerted when the oil surface was not protected by the food. The low degradation level obtained during continuous frying operations without oil reposition would indirectly show the protection against oxidation provided by the food in the fryer.