Investigations on the Hot Air Roasting of Nuts

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Roasting of nuts is a traditional and empirical process applied in nut manufacturing to create a typical roasting flavor and to develop a roasting color. Due to a complete dehydration during roasting, a crisp texture is developed.

Nuts and oilseeds contain oil with a high amount of unsaturated fatty acids. Thus, the oil presents the most sensitive component to oxidation, which in turn limits shelf life of the roasted products. The retention of the oxidative stability is important in industrial nut manufacturing.

This presentation aims at the introduction of basic principles involved in the oxidation of whole and chopped nuts. A concept for process optimization with regard to lipid oxidation and shelf life is presented. This concept was realized in a two-step roasting process. Finally, preliminary results from industrial two-step roasting experiments are presented.

The research was carried out at the Swiss Federal Institute of Technology (ETH) in Zurich, together with G. W. Barth Ludwigsburg GmbH & Co., Keme Food Engineering Ltd. and the German Fraunhofer-Institute for Food Technology and Packaging ILV.

OXIDATION STABILITY IN ROASTED NUTS

The aim of roasting nuts is the retention of a good oxidative stability, which in turn determines the shelf life of roasted nuts and manufactured products containing roasted nuts. Therefore, it was important to investigate the influence of the most important process parameter—the roasting temperature. Because the roasting temperature is an undefined process parameter, the in-line determination of real internal product temperatures in small scale experiments had to be established. For small scale experiments, the product temperature serves as the relevant temperature parameter.

In our experiments, a strong relationship between product temperature and oxidation rate was observed (Figure 1). The oxidation rate of roasted nuts increased considerably with increasing product temperatures. Process duration was only of minor influence for the resulting oxidative stability of the nuts. Thus, the final product temperature during roasting represents the first important factor in shelf life retention.

In order to gain further information about the oxidative stability of

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