Assessment of DAK formation during interesterification of edible oils and fats.

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Development of the interesterification (IE) process is a consequence of the necessity to replace partial hydrogenation, which presented the drawback of forming TFA, known to cause adverse health effects. Both chemical (CIE) and enzymatic (EIE) interesterification are common practices to prepare fats with improved physicochemical properties, suitable for trans-free formulations. It has been shown that CIE technology may produce by-products, such as long-chain DiAlkylKetones (DAK), while EIE does apparently not (Verhé et al., 2006; Danthine et al., 2022). The effects of DAK intake on human health are not known yet. Some of the fat producers, however, tried to reduce the DAK content as a precautionary principle.

In this context, the aim of this work consisted in highlighting the DAKs formation during IE, so as to determine which conditions are favourable to their formation and to evaluate how to minimize or how to avoid them. To this end, several edible oils and fats have been selected, based on their potential use in IE (a hard fat combined with a softer fat), on "new fats" categorization (sunflower and palm oils of the high oleic type), and on relative percentage (to highlight the possible influence of unsaturation level). Refined *Elaeis guineensis* palm stearin (PS), high oleic palm stearin (HOPS), palm kernel stearin (PKS), high oleic sunflower oil (HOSO) and high oleic palm oil (HOPO) were selected to prepare the investigated blends : PKS-HOPO, PS-HOPO, HOPS-HOPO, and PS-HOSO (70-30 ; 50-50 ; 30-70 w:w%). They were all CIE (using sodium methoxide as catalyst) and EIE (using TLIM lipase) and further analysed for their physicochemical properties and for their DAK content, using an optimized method for the determination of DAK in fats (Mascrez et al., 2021). Finally, CIE processing parameters (temperature, time, amount of catalyst) have been modified according to an experimental design (DoE), in an attempt at understanding how to modulate the level of DAK produced.