

Physical Refining: Evaluation of Different Temperatures on the Hydrolysis of Triacylglycerols and Formation of FFA

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Crude vegetable oils are mainly composed of triacylglycerols along with some free fatty acids (FFA), monoacylglycerols (MAG), and diacylglycerols (DAG). They also contain varying amounts of other minor components such as phospholipids, free and sterified sterols, tocopherols, odor-causing substances as well as traces of metals. Physical refining and deodorization processes in the oil industry are intended to vaporize odoriferous compounds and the FFA from the oil by applying high temperatures and low pressures with the addition of live steam as a stripping gas. However, the processing conditions associated with the presence of steam, which improves the separation of FFA from the oil, also facilitates the occurrence of hydrolysis of triacylglycerols generating FFA and contributing to the losses of neutral oil. Therefore, this work proposes to verify the effect of different temperatures (from 230-260 °C) considering constant stripping time (2.5 h) and steam flow rate of 0.1ml/min on the formation of partial acylglycerols and FFA. The experiments were carried out in a laboratory-scale batch deodorizer. The glass batch deodorizer was loaded with refined palm oil and placed in an oven with controlled and monitored temperature. In general, the results showed that the generation of FFA increases with the increment of the process temperature. The MAG concentration in the distillate decreases for higher temperatures, while DAG and TAG increases probably also due to the entrainment or mechanical carry-over of neutral oil drops within the stripping steam.