System Development from Organic Solvents to Ionic Liquids for Synthesizing Ascorbyl Esters with Conjugated Linoleic Acids

The aim of this paper is to screen suitable reaction systems for the modification of antioxidants through enzymatic synthesis. Enzymatic esterification of ascorbic acid with conjugated linoleic acid (CLA) was investigated as a model. Four organic solvents and five different enzymes were evaluated. Results show that only Novozym® 435 turned out to be a useful enzymatic preparation for the production of ascorbyl-CLA ester. The optimum reaction conditions in the organic solvent system were 4 h at 55°C and at a molar ratio of 5 (CLA/ascorbic acid). The esterification reaction was transferred to an ionic liquid system for the purpose of improving solubility of the polar substrate and avoiding the application of organic solvents. From screening experiments, it was evident that only methyltriocytethylammonium trifluoroacetate (tO-MA·TFA) could provide a proper reaction environment for production of ascorbyl-CLA ester when using Novozym® 435 as biocatalyst. It was possible to significantly increase the productivity (150 g/l) through the increase of ascorbic acid solubility in ionic liquids by super saturation together with the increase of reaction temperature to 70°C, far beyond than that in organic solvents (35 g/l) after preliminary optimizations for both systems.