Optimization of Lipase-Catalyzed Synthesis of Acetylated EGCG by Response Surface Methodology

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EGCG acetylated derivatives were prepared by acylation of EGCG with vinyl acetate, catalyzing by immobilized lipase from Candida Antarctica in acetonitrile. Response surface methodology (RSM) was used to evaluate the effects of the reaction temperature, time, usage level of the enzyme, and the EGCG / vinyl acetate mole ratio on the EGCG acetylation conversion yield. A 29 full-factorial central composite design was used to optimize the enzymatic process conditions. By using multiple regression analysis, the experimental data were fitted to a second order polynomial model. The most suitable combination of variables was 40 °C, 2.0%, 12h and 1:1 for the reaction temperature, the enzyme amount, the reaction time, and the EGCG / vinyl acetate mole ratio, respectively. At these optimal conditions, the conversion yield reached 90.15%. Acetylation of EGCG derivatives was obtained, and the products were analyzed using HPLC. The eluted products were analyzed by Mass Spectrometer to identify the mono-, di- and tri-acetylated derivatives from the reaction.