

Optimization of lipase catalyzed synthesis of Ethyl Valerate, a green apple flavor using Response Surface Methodology (RSM).

ABSTRACT

Ethyl valerate, a green apple flavor is short-chain ester with fruity notes is widely used in food, cosmetic and pharmaceutical industries. Traditionally, flavor esters are produced by chemical method or extracted by natural sources. However, with the steadily growing demand for natural flavor compounds, the biosynthesis of such esters by lipase under mild conditions has been receiving much attention for producing these valuable products. In this study, enzymatic synthesis of ethyl valerate in solvent free system, was successfully optimized via response surface method (RSM) based on 5-level, 4-variable of central composite rotatable design (CCRD). The parameters were reaction time (30-60 min), reaction temperature (30-60 °C), amount of enzyme (10-25%, w/w) and shaking speed (50-150 rpm). The optimum condition derived via RSM for the reaction was reaction time of 48 min, reaction temperature of 30 °C, enzyme amount of 25%, (w/w) and shaking speed of 51 rpm. The actual experimental yield was 84.28 % under the optimum condition, which compared well with the maximum predicted value of 84.61%. Comparison of predicted and experimental values reveals good correspondence between them, implying that empirical models derived from RSM can be used to adequately describe the relationship between the factors and response in the synthesis of ethyl valerate.

Keyword: Ethyl valerate; Flavor ester; Lipase; Surface response method.