

## **Optimization of enzymatic synthesis of palm-based kojic acid ester using response surface methodology**

### **ABSTRACT**

Kojic acid monooleate is a fatty acid derivative of kojic acid which can be widely used as a skin whitening agent in a cosmetic applications. In avoiding any possible harmful effects from chemically synthesized product, the enzymatic synthesis appears to be the best way to satisfy the consumer demand nowadays. The ability of immobilized lipase from *Rhizomucor meihei* (lipozyme RMIM) to catalyze the direct esterification of kojic acid and oleic acid was investigated. Response Surface Methodology (RSM) and 5-level-4-factor central composite rotatable were employed to evaluate the effects of synthesis parameters such as enzyme amount (0.1-0.4 g), temperature (30-60 degrees C), substrate molar ratio (1-4 mmol, kojic acid:oleic acid) and reaction time (24-48 h) on percentage molar conversion to kojic acid monooleate. Analysis of the product using TLC, GC and FTIR showed the presence of kojic acid monooleate. The optimal conditions for the enzymatic reaction were obtained after analysis with backward elimination using 0.17 g of enzyme and 4 mmol of substrate at 52.50 degrees C for 42 h. Under these conditions the esterification percentage was 37.21%. The results demonstrated that response surface methodology can be applied effectively to optimize the lipase-catalysed synthesis of kojic acid monooleate. The optimum conditions can be used to scale up the process.

**Keyword:** Kojic acid monooleate; Lipase; Optimisation; Response surface methodology