SKAM 27

27th Regional Symposium of Malaysia Analytical Sciences

Simposium Kimia Analisis Malaysia Ke-27

Analytical sciences for eco-friendly society

Sains analisis untuk masyarakat mesra alam

PROGRAMME & ABSTRACT BOOK

8-10th December 2014
KSL Resorts, Johor Bahru
Johor,Malaysia

Organized by:

ANALIS
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Optimal Conditions for the Immobilization of Lipase in Nanosilica KIT-6 Matrix

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The current demands of the world's biotechnological industries are enhancement of enzyme productivity and development of novel techniques for increasing their shelf life to facilitate large scale and economic formulation. Immobilization of lipase by adsorption onto solids surfaces such as polymers[1], silica[2] and clay[3] led to improved performance of the enzyme. This paper reported on lipase from *candida rugosa* immobilized in nanosilica KIT-6, in which the unique properties of KIT-6 including high surface areas, modifiable surface, and tunable pore sizes were utilized to improve the enzyme activity in hydrolysis of olive oil. The immobilization of lipase in the KIT-6 matrix was found to generate synergistic effects that enhanced enzyme stability, improved product selectivity, and facilitated separation and enzyme reuse. Lipase immobilization onto KIT-6 was optimized by varying synthesis parameters such as temperature (4-60 °C), pH (4-9 pH) and solid-liquid ratio of the enzyme solutions (0.03-0.5). The optimal immobilization conditions were pH 7.0 at 37°C and solid to liquid ratio 0.2 (v/v). Based on the enzyme activity, the immobilized lipase in nanosilica KIT-6 displayed higher operational stability than free lipase, including wider thermal and pH ranges.

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