The effects of microgravity on thermostable T1 lipase protein crystal

ABSTRACT

The quest for the characterizations of intrinsically thermostable T1 lipase either physicochemically or structurally is a prominent task. T1 lipase can be effectively used as an additive in detergent formulations, and as a biocatalyst for natural oil-based pharmaceuticals, foods and fine chemicals. The thermoalkaliphilic T1 lipase gene of Geobacillus zalihae sp. nov. strain T1 T (Rahman et al., 2007) was overexpressed in the pGEX vector in E. coli (Loew et al., 2004). Expression of T1 lipase as a glutathione S-transferase (GST) fusion protein in prokaryotic systems was expected to allow rapid purification of recombinant T1 lipase through affinity chromatography. High-yield purification of T1 lipase was achieved through two-step affinity chromatography with a final specific activity and yield of 958.2 U/mg and 51.5%, respectively. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE) analysis showed that the purified T1 lipase appeared as 39 kDa after the removal of the 26 kDa GST tag from the digested fusion lipase. However, the native molecular weight of T1 lipase was determined to be approximately 43 kDa by gel filtration chromatography. The size was similar to its predicted molecular weight, but slightly bigger than its denatured form obtained through SDS-PAGE (Leow et al., 2007).

Keyword: T1 lipase; Thermostable; Microgravity; Crystal