

Characterization of the physical properties of palm kernel cake

Abstract

A systematic sieving method (1 kg sample; 50 Hz; 0 inclination; 20 min) was used to obtain particle size distribution of palm kernel cake containing seven different particle sizes (4.83, 2.68, 1.50, 0.80, 0.51, 0.32, and 0.11 mm). Regardless of particle size, palm kernel cake was found to be of different shapes qualitatively with optical microscopy and quantitatively (variation in mean length, mean volume, and volume-surface mean diameters), non-porous (Brunauer-Emmett-Teller specific surface area $<1 \text{ m}^2/\text{g}$), and to contain an uneven rough surface, as shown in scanning electron microscopy. Palm kernel cake of 0.32 mm and less were aggregates with uneven rough surface, and those of 0.51 mm and more were agglomerates with interstices formed from particle agglomeration. These characteristics affected the bulk density of palm kernel cake that decreased with decreasing particle sizes due to lower packing density and higher void. The physical properties affected the hydration properties. This information is useful for the solid-state fermentation of palm kernel cake.