

Food waste-dry leaves composting: Mixture formulation, turning frequency and kinetic analysis

ABSTRACT

Composting is a controlled biological process that converts organic matter into soil conditioner and kinetic modelling is necessary to design the composting system. The aims of this study are to determine the optimum compost mixture and turning frequency for food waste and dry leaves composting, as well as to evaluate an elemental kinetic model based on volatile solids (VS). The elemental kinetics of the process were determined using pseudo zero-, first-, second- and n-order equations. Three different feedstock mixtures were used, namely 40% FW (Mix A), 60% FW (Mix B) and 80% FW (Mix C). Four sets of experiments (TF for every 0, 1, 3, and 5 days) were conducted to investigate the turning frequency (TF). The composting process was carried out in a compost bottle for 40 days. Based on organic matter loss, Mix B and C had the highest OM loss, indicating an acceptable initial compost mixture. The turning frequency of every three days resulted in the highest organic matter loss. Kinetic analysis was performed using coefficient correlation (R^2), root mean square error (RMSE) and modelling efficiency (EF). Application of the second-order model resulted in good responses for compost mixture Mix B and C. Meanwhile, the n-order model successfully estimated the VS changes for the 3-days TF.