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Evaluation of Korean food waste composting with fed-batch operations I: using water extractable total organic carbon contents (TOCw)

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Abstract

Evaluation of fed-batch composting, with three different moisture conditions, for Korean food wastes was conducted using the water extractable total organic carbon content (TOCw) of mixed materials. Composting with about 50% initial moisture content was slightly more effective than composting with about 60% initial moisture content and of that where the moisture content was constantly controlled at about 50%. These different efficiencies were shown well by various indices of the composting rates, especially those based on variations of the TOCw in the mixed materials. The TOCw content represents the easily biodegradable components of organic waste, rather than the total biodegradable portion. The initial TOCw content of the mixed material

the volatile or dry solids contents. The rates of the TOCw degradation showed relatively good correlations with the rates of the total wet weight reduction, as well as the rate of CO₂ evolution, during the composting process. Therefore, it could also be used as a more appropriate index for the evaluation of this kind of high-rate composting process. Additionally, variations in the TOCw clearly followed the Arrhenius equation and its degradation could be estimated quantitatively using a first order reaction model. Moreover, the percentage of TOCw degradation in each cycle could be predicted based on the similarity of variations in the TOCw of each cycle in a fed-batch composting process.



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Keywords

Food waste composting; Fed-batch operation; Moisture content; Water extractable TOC; Composting rate

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