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### EMISSION OF CH<sub>4</sub>, CO AND NH<sub>3</sub> DURING COMPOSTING OF SYNTHETIC FOOD WASTE IN A CONTROLLED PILOT-SCALE COMPOST REACTOR

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**ABSTRACT** Composting has general acceptance as an inexpensive, simple and environmentally benign process for organic waste disposal. However, when not properly managed, it can result in the emission of toxic and environmentally hazardous gases. Volatile emissions from composting can include methane (CH<sub>4</sub>), ammonia (NH<sub>3</sub>), nitrous oxide (N<sub>2</sub>O) and carbon monoxide (CO). Due to the potential negative consequences of composting, there is a need to gain a better understanding of the physical conditions that affect these volatile emissions in order to better control them. The objective of this project was to construct a pilot-scale compost reactor, as a platform to study the potential impact of temperature, humidity, oxygen concentration and air flow rate on the gaseous emissions from compost. Fourier Transform Infrared (FT-IR) spectrometry was used to quantify the gaseous emissions from the compost reactor under different physical conditions. For the sake of uniformity, a synthetic compost substrate was prepared for the experiments by mixing dog food with wood chips, paper and water. To test the performance of the constructed system, emission rates of methane, ammonia, nitrous oxide and carbon monoxide were measured under several different temperature and oxygen concentration regimes. At the time of the writing of this paper, results for the volatile emissions from compost have yet to be obtained. Results will be presented during the World Congress of the International Commission of Agricultural Engineering in Quebec City, Quebec, June 13-17, 2010; an updated paper will be available from the author.

**Keywords:** Compost, Modeling, Gaseous emissions, Fourier transform infrared spectrometry, Microbial ecology.