

Carbon Monoxide Emission from Municipal Co-Composting

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High concentrations of carbon monoxide (CO) have been observed in the enclosed composting facility of the Cloverbar Municipal Waste Management Centre, Edmonton, Canada. Elevated CO concentration in the facility is a potential health threat to the workers. The production of CO, usually associated with incomplete oxidation of carbonaceous substrates, is almost unmentioned in the scientific literature about composting. The objectives in this study are to: (1) Assess temporal and spatial variability of CO emissions from the composting bays using Fourier Transform Infra-Red spectroscopy, and (2) Identify any correlations between CO emission rate, microbial population diversity, compost physicochemical properties, and operating parameters. Preliminary data from one bay showed maximum values of 11 $\mu\text{L L}^{-1}$ CO in the ambient air above the compost bed, 115 $\mu\text{L L}^{-1}$ within the compost bed, and 42 $\mu\text{L L}^{-1}$ in the aeration pipes under the downdraft-aerated composting bays. The C:N ratio of the compost ranged from 10 to 22, temperature from 56 to 72°C, and moisture content from 38 to 55%. The high concentration of CO within the compost corroborates the hypothesis that chemical or microbial activity within the compost is the likely source of the CO. Planned work will include more intensive measurement of gas emissions and compost characteristics, and the use of genomic assays to characterize the microbial populations in the compost. This study will clarify the mechanism of CO production, allowing optimization of the process for improved worker safety and possibly for more efficacious composting.