Correlating Compost Physicochemical Properties with Processing

Agapiou A.[2], Vasileiou A.[1], Stylianou M.[2], Mikedi K.[3], Zorpas A. A[1]

[1]Open University of Cyprus, Faculty of Pure and Applied Sciences, Environmental Conservation and Management, Laboratory of Chemical Engineering and Engineering Sustainability, P.O.Box 12794, 2252, Latsia, Nicosia, Cyprus

[2]Department of Chemistry, University of Cyprus, P.O.Box 20537, 1678 Nicosia, Cyprus

[3]School of Chemical Engineering, National Technical University of Athens, 9 Iroon Polytechniou Street, 157 73 Athens, Greece

*Corresponding author email: agapiou.agapios@ucy.ac.cy

Household composting is a fast and environmentally friendly process, promoting the separation at the source and leading to the decrease of the household waste volume. During the processing, it is well known that microorganisms (including bacterial and fungi) break down the complex organic matter into simpler products, and finally into a mature compost. The aim of the present work was to correlate six basic compost physicochemical parameters (temperature, humidity, organic content, pH, conductivity and germination index) with the produced odor, by monitoring the emitted Volatile Organic Compounds (VOCs). Therefore, two composting containers with volume of 330 L were placed in a fenced open area. In container 2 (C_2), additional 5% lawn trimming were added compared to container 1 (C_1), so that the composition to be more similar to the back yard composting process. Samples were obtained on a weekly basis from each container both for the VOCs and the physicochemical parameters analysis for two months. VOCs determination was carried out using headspace solid-phase micro extraction gas chromatography - mass spectrometry (HS-SPME-GC/MS) analysis. During the composting process, several VOCs were identified, mostly terpenes, oxygenated compounds and depending on the conditions, organic sulfur compounds. The most abundant VOC detected during the process was limonene. Multivariate statistics were further employed to enlighten possible correlations between the emissions and the process parameters. The results of chemometrics analyses are presented and discussed.