Journal of Ecological Engineering
Volume 18, Issue 4, July 2017, pages 90–94
DOI: 10.12911/22998993/74285 *Research Article*

INFLUENCE OF OZONE AERATION ON TOXIC METAL CONTENT AND OXYGEN ACTIVITY IN GREEN WASTE COMPOST

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Received: 2017.04.29
Accepted: 2017.05.31
Published: 2017.07.01

ABSTRACT
This paper presents the results of work on the reduction of toxic metal content while decreasing its oxygen activity. During the study the effects of different doses of ozone in the air used for aeration of the stabilized compost in the first post-thermophilic phase were analyzed. The results showed the possibility of reducing the concentrations of toxic metals and decrease the activity of oxygen by up to 30%, compared to traditional stabilized compost aeration system without using ozone.

Keywords: compost, ozone, toxic metals

INTRODUCTION

The intensive socio-economic development that we observe in Poland causes an increase in the fraction of biodegradable waste. In accordance with applicable Polish law and EU guidelines called circular economy, a lot of efforts should be made to make the best use of raw materials which may be subject to the processes of recovery and recycling of waste. In Poland, material recovery is governed by the provisions of the Waste Act of December 2012 and the guidelines of the Department of Waste Management in the Ministry of Environment of December 2008. By analyzing the above documents, it was found that the main process of recovering biodegradable raw materials is composting [Grzesik and Malinowski 2016, Guidelines … 2008, Dz. U. 2013 poz. 21, Ghiselliniet al. 2016, Morales et al. 2016].

In moderate climate conditions composting process is divided into two stages, with a total length of about 60 days. The duration of the process depends on the choice of the composting method (active system with aeration of material or passive without aeration) and the material to be processed. Based on the literature analysis of the subject, it was stated that the first stage of the composting process should take up to 14 days.

Then the material is subjected to stabilization, which lasts about 6 weeks. At present, the works on optimization of the composting process kinetics in the first phase and elimination of accompanying odor emissions in the whole process are carried out in the world. [Lebreroet al. 2011,Gutierezet al. 2015, Yuan et al. 2015, Fernándezet al. 2016, Jinyiet al. 2016, Sileset al. 2016, Yongjianget al. 2016].

Optimization of the stabilization phase of the obtained compost relates to the possibility of using various substances neutralizing additional impurities (e.g. toxic metals, petroleum products, etc.). The literature on the subject also describes the experience that refers to the hygienisation of stabilized compost and the possibility of using gases produced during the process. [Benlboukhtet al. 2016, Junyaet al. 2016, Lian et al. 2016, Mukeshet al. 2016, Vandecasteeleet al. 2016, Yuquanet al. 2016].

From a review of the subject literature, it appears that the major problem limiting the use of