

Title: ANALYSIS OF GAS CONCENTRATION IN AN EXPERIMENTAL CELL OF MUNICIPAL SOLID WASTE AND YOUR RELATION WITH TOTAL AEROBIC BACTERIA

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Abstract:

The gases composition in a Municipal Solid Waste landfill is related to the phases of decomposition of the organic matter. The degradative phases have compositions characteristics of biogas, which is one of the biodegradation products. So, monitor the aerobic bacteria present on an experimental cell is a way of understanding the biodegradation process, since, these microorganisms are responsible for transforming complex molecules, into smaller molecules which can be harnessed and degraded by other groups of microorganisms. This work aims to analyze the concentrations of gases produced in an experimental cell and relates them with the quantification of total aerobic bacteria. The research covered the construction stages, collecting and filling the experimental cell with the solid waste twelve districts of the city of Campina Grande-PB, Brazil. The experimental cell has 2.0 m internal diameter, 3.5 m high and a volume of about 11 m³, presents twelve waste collection points. The determination of gas concentrations was performed using a portable infrared detector Dräger X-am 7000, in terms of CH₄, CO₂ and O₂. For quantification of total aerobic bacteria, were weighed 10 g of waste samples and diluted in 90 ml of distilled water. Were used dilutions of 10⁻¹ to 10⁻⁸ and the culture medium used was a PCA - Plate Count Agar. Samples were incubated in a greenhouse at 36.5°C, for 48 hours. Then, it was performed of the number count of colonies (Colony Forming Units). Based on the results, it was observed that the concentrations of CH₄, CO₂ and O₂ ranged from 3 to 19.5%, from 7.4 to 33% and from 1.3 to 4.2%, respectively, throughout of the period from 246 days. Most of the degradation process of MSW is anaerobic, however, the presence of aerobic bacterias was verified during the whole process, occurring just a decay in order of magnitude of 10⁸ to 10⁶, being probable the interference of the meteorological conditions, through points collection and cracks in the cover layer. On the results, the CO₂ concentration represents the most part of the gases generated, probably, due to acidogenic processes and acetogenic. Therefore, the aerobic bacteria are important in the waste biodegradation process and not harmed until the moment, the gases generation, because, help decrease the oxygen gas accumulation, harmful to anaerobic bacteria.

Keywords: Aerobic Bacteria. Biodegradation. Experimental Cell. Gas. Municipal Solid Waste.

Fomentation Agency: CNPq