

Mathematical Modelling of Leachate Production from Waste Contained Site

Ojolo S. Joshua, Ismail S. Oluwarotimi*, Apeh E. Solomon

Department of Mechanical Engineering, University of Lagos, Lagos, Nigeria

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Abstract

In this work, mathematical models of leachate production from Waste Contained Site (WCS) was developed and validated using the existing experimental data with aid of MATLAB, 2007a. When the leachate generation potentials (Lo) were 100m³, 80m³ and 50m³, the maximum amount of leachate generated were about 2920m³, 2338m³ and 1461m³ for about 130 days respectively. It was noted that as the leachate percolates through a selected distance, the concentration keeps decreasing for one-dimensional flow in all the cases considered. Decreasing in concentration continues until a point was reached when the concentration was almost zero and later constant. The effects of diffusivity, amount of organic content present within the waste and gravity, as cases, were also considered in various occasions during the percolation. Comparison of their effects was also taken into account. In case of gravity at constant diffusivity, decrease in concentration was not rapid but gradually while much organic content in the waste caused the rate of leachate production to be rapid; hence, giving rise to a sharp sloped curve. It can be concluded that gravity influences the rate of change in the concentration of the leachate generation as the leachate percolate downward to the underground water. When the diffusivity and gravity are put into consideration, the concentration of the leachate decreases gradually and slowly.

Keywords: leachate production, waste contained site, percolation, diffusivity, gravity

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* Corresponding author. E-mail address: isikiru@unilag.edu.ng

Tel.: +234(0)8030700030, +234(0)8050966306.

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