Ultimate Composition Analysis of Municipal Solid Waste in Muscat

Wala AL Amri

Abstract

Municipal solid wastes are daily generated refuses from different sources that contains various composition that may affect public health as well as the environment. The aim of this study is to analyze the ultimate composition of municipal solid waste in Muscat, Sultanate of Oman. The study was conducted on 22 samples that were collected from the 15th campaign of waste characterization at Al Amerat landfill in February 2015. Different size fractions of less than 8 mm up to 100 mm were used as well as 11 waste categories samples.

At the same time two different sets of leachate samples were used in this study, the first set was collected on March 2015 and the second set was collected on April 2015. Each set consists of two type of leachate, a relatively fresh leachate collected from the pond inlet and the older leachate samples were collected from the leachate pond.

The analysis of this study was done for physical characteristics of MSW (composition of waste, moisture content and density), as well as the approximate analysis of chemical characteristics (moisture content, volatile content, loss on ignition and total oxides) and the Ultimate Analysis (CHNS/O analysis, chemical content, heavy metals, heating value and energy content).

The leachate characteristics were also analyzed (pH, electrical conductivity, turbidity, total solid, bacteriological analysis, biochemical oxygen demand (BOD), chemical oxygen demand (COD), and total organic carbon (TOC) and Ammonia Nitrogen).

The main composition of the waste generated were 24% plastic wraps, 14% cardboard and 8% food which accounted 46% of total characterized sample weight. More than 40% of disposed materials at Al Amerat landfill consisted of biodegradable organic components. These materials are being landfilled without any form of treatment. Based on the results obtained, this study is recommending a ‘Waste to Energy’ program in the near future as the waste of the landfill has an energy content of more than 22,000 kJ/kg. The content of the waste was presented in a chemical formula with sulfur $C_{215}H_{395}O_{120}N_2S$ and without sulfur $C_{125}H_{230}O_{70}N$. 