

Compositional and microsampling analysis of MSW of Astana city and application of a predictive Waste Generation Artificial Neural Network Model.

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Landfilling remains one of the widely applied ways of remediating municipal solid waste (MSW) practiced worldwide due to its proven economic advantage over other alternatives. However, it exhibits several environmental drawbacks while it requires large area for its construction. Nevertheless, detailed characterization of MSW coming into landfilling site ought to be performed prior to since its composition may vary from season to season and from place to place.

There are studies dedicated on detailed characterization or microsampling of several waste streams directly coming into the landfill. Detailed compositional analysis of waste streams reported in these studies aid in developing waste management framework and resolving the issues associated with it. Although, the composition of waste stream affected by numerous factors, regression models have been developed to predict the future waste composition. In this study, a microsampling analysis was performed during two sampling campaigns conducted in Summer 2018 and Winter 2019, according to ASTM 5231 – 92 at Astana city municipal landfill site. A microsampling was conducted between 1st and 2nd step sorting for selected waste stream categories. The *Paper* waste stream was further classified into: Newspaper and Magazines, Office Paper, Packaging and Other, *LDPE* fraction into: Bags and Others, *Glass* stream into: Transparent, Brown and Green, *Organic* stream into: non-compostable food waste and compostable, *Rest* stream into: Pharmaceuticals and Others.

It was revealed that substantial amount of *LDPE* waste is plastic bags, which shows characteristic consumption habits of population. Moreover, 8.3% of *Organic* waste found be to suitable for composting. The share of pharmaceutical waste in total mixed MSW is 0.4%. Following chemical and physical analysis are also conducted for constituents of MSW sampled: moisture test, proximate and ultimate analysis, calorimetry analysis, and elemental analysis. In addition an Artificial Neural Networks Model was applied to project the future composition of MSW in Astana city. This would help in strategic planning of the waste management policies for local authorities.