

Physico-Chemical Analysis of Municipal Solid Waste (MSW) in the Accra Metropolis

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Abstract

Solid waste management programmes are driven by a desire to keep clean environment in the hope of promoting sound environmental quality and public health. Good solid waste management programmes rely upon a complete understanding of both physical and chemical attributes of the waste materials, which in turn govern their behaviour in the natural environment. These physico-chemical parameters, therefore, serve as proxy indicators of which waste management options would be most suitable for adoption in the implementation of an integrated municipal solid waste programme for a given community. The study was, therefore, undertaken to generate scientific information on both the physical and chemical composition of municipal solid waste (MSW) in the Accra Metropolis. The results showed that the MSW in the city was very wet with an average moisture value of 60% by weight of fresh wastes and calorific values ranging between 14.0–19.5 MJ/kg. The results also showed that the C:N ratios in the waste components were in the range of 27:1–100:1, and that these physical and chemical properties were very variable amongst the various waste components and among the waste zones. These results indicated that the MSW in the metropolis might be a good candidate for composting programmes and that waste-to-energy conversion by incineration might not be economically viable.

Introduction

Solid waste constitutes a major problem in Ghana and affects both the urban and peri-urban areas on a much similar scale of importance. Whilst in the urban areas the task is largely collection, storage, transport and disposal of municipal solid waste (MSW), in peri-urban areas the task is reduced to removal from homes. In Accra for example, the rate of generation of MSW was estimated at 0.4 kg/capita/day (Fobil, 2001; Carboo *et al.*, 2001). Accra, estimated to be 85% urbanized and covering 200 sq. km is the capital city and the seat of Government of Ghana. It is the hub around which both political and economic life in the country revolve. With an average per capita waste generation per day of 0.4 kg and an

estimated city population of 2.7 million people (2000 population census), Accra alone generates approximately 1000 tons/day and an annual generation rate of 3.7×10^4 tons/year (Fobil, 2001).

Existing collection capacity could only keep up with about 55% of this figure; which meant an excess of 1.7×10^4 tons/year was left to accumulate in the city core areas for long periods of several months, and became a veritable recipe, not only for mosquito and fly breeding, but also factories from which emanated obnoxious odours, as well as offensive smells (Armah, 2001; EPA-Ghana, 1997; Fobil, 2001; Fobil *et al.*, 2002). Most of the regional capitals in Ghana are facing similar solid waste management problems. The situation exacerbated in the