Chapter 9
Composition of Leachate

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ABSTRACT

Solid waste is an important environmental problem in both developing and developed countries. Management of Municipal Solid Waste (MSW) is one of the main modern environmental issues in municipal areas because of both its huge amount and variety of constituents. Information on characteristics of MSW is important for the formulation of new waste management policy. Landfill leachate is defined as an aqueous effluent produced when water percolates through the waste in a landfill. The nature of landfill leachate depends on the type of MSW being dumped, landfill age, moisture content, seasonal weather variations, site hydrology, the stage of decomposition in the landfill and pH. Produced leachate could contain large amounts of contaminants measured as COD, BOD5, NH3–N, heavy metals, phenols, phosphorus etc. Obviously, as landfill age increases, the biodegradable fraction of organic pollutants in leachate decrease as an outcome of the anaerobic decomposition occurring in landfill site. Thus, mature or stabilized leachate contains much more refractory organics than young leachate.

INTRODUCTION

The rapid growth in volume and forms of solid and hazardous wastes as a result of continuous economic development, industrialization, and urbanization is an increasing problem faced by domestic and local governments in ensuring an efficient and sustainable waste management.Solid waste(SW) has continued to be a major problem in many nations of the world. Solid waste has gradually become a threat to the environment of developing countries as they progressively move towards industrialization (Mojiri, 2014). SW is a serious environmental problem in both developing and developed countries (Moghadam et al., 2009). It could be defined as garbage, refuse and other unnecessary materials produced from commercial, industrial, community, and agricultural activities. Commonly, it requires a good planning and management. In general, SW management consists of: 1) Removing discarded materials from populated areas in a timely manner to avoid risk of disease, fires, and minimize problems arising from decomposition of organic matter; and 2)

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Disposing of the useless materials in a manner that is environmentally satisfactory (Davis & Cornwell, 2008). Additionally, the nowadays aim of the solid waste management is to set up a sound material cycling society via the '4Rs" (reduce, reuse, recycle, and recover).

Municipal solid waste management (MSWM) is one of the significant modern environmental issues in urban areas due to its huge amount and variety of constituents while its major fractions include household garbage comprising of kitchen waste, street sweepings, yard trimmings, construction and demolition debris, wastes from water and wastewater treatment-plants, industrial and commercial refuse and biomedical solid waste (Pattnaik& Reddy, 2010 andDemirbas, 2011). Generally, hazardous wastes are not included in municipal solid waste (MSW) classification (Weiner & Matthews, 2003). Information on characteristics of MSW is important for the formulation of new waste management policy.

MUNICPAL SOLID WASTE MANAGEMENT (MSWM)

In 2006, the estimated total volume of MSW generated internationally reached 2.02 billion tons, indicating a 7% annual rise since 2003. Between 2007 and 2011, the rise in universal generation of urban waste was estimated at 37.3%, equivalent to an increase of approximately 8% per year (UNEP, 2009). Municipal solid waste (MSW) management is an important aspect of urban planning and development. MSWM is considered as a public service, providing citizens with a scheme of disposing of their waste in an economically and environmentally friendly method (Beigl et al., 2008). It is one of the main concerns in most cities of the developing countries due to rapid modernization and urbanization that consequently lead to increased rate of MSW production and disposal (Manaf et al., 2009 and Zhang et al., 2010). Additionally, Al-Khatib et al. (2010) stated that rapidly growing population, quick economic growth and improved community living standards have resulted in increased generation rate of MSW, the management of which is a great challenge for concerned authorities. MSWM is a significant feature of environmental hygiene in addition to planning, administration, organization, financial and legal aspects of different activities associated with generation, collection, transportation, and disposal processes (Figure 1). In other words, MSWM in an environmentally friendly way that should adopt principles of aesthetics, economy, conservation and energy (Hui et al., 2006 and-Pattnaik& Reddy, 2010).

Figure 1. Sketch for integrated solid waste management: (a) Interactive, and (b) Hierarchical (Source: Nemerow et al., 2009)