



Abstract:

Energy demand is increasing at a rapid rate with increasing population and urbanization, to satisfy this energy demand in both developed and developing countries, the rising need of utilizing renewable sources for energy production has been observed. Among the nonconventional resources, biomass is taking worldwide attention because of its biodegradability and lower GHG emissions with different valuable fuels that can be used as feedstock in waste to energy techniques. Thus municipal solid waste has a great tendency to produce energy which is neglected area in Pakistan. The study focuses on MSW that is one of the biomass based renewable source because of high waste production exerting socioeconomic problems in Lahore. Waste specimens were collected from Lahore, covering area from all nine towns of Lahore. Biomass resources found in municipal solid waste were analyzed for selection of most favorable WTE technology, including incineration, anaerobic digestion, RDF, and landfilling on the basis of thermo-chemical properties. In this regard, proximate analysis, ultimate analysis and calorimeter tests were performed on the waste specimens. The results from the analysis showed that Lahore's waste was mainly organic (-%) with high moisture content (mean; 61.72%) and corresponding mean values of fixed carbon and ash content were 4.21% and 4.15%, respectively. The organic nature of waste and high moisture content subjected it to pre-treatment for drying and also showed its suitability for anaerobic digestion on the basis of optimal C/N ratio, organic nature of waste, net operational and capital cost, and skilled labor requirement as compared to other techniques. The ultimate analysis showed elemental concentrations of nitrogen, sulfur, chlorine and hydrogen were small, reduced emissions during combustion. The average higher heating value determined by bomb calorimeter was 14.41 MJ Kg^{-1} which is in good agreement with the mathematical calculated values, i.e. 14.93 MJ Kg^{-1} and 13.91 MJ Kg^{-1} , showing the suitability of biomass for waste to energy program.