

Characterization of mixed plastic wastes as a potential renewable energy resource

ABSTRACT

The management of waste materials is a problem worldwide. Incineration technology to burn all kind of wastes and reduce them to much smaller volume i.e. ashes and gas emission is not accepted in Malaysia due to public concern on dioxin and furan emission to the environment. In this study, the characteristics of flue gas emission from various kinds of plastic wastes as well as the calorific value were investigated. HDPE, LDPE, PS, PVC, PP and PET were incinerated in a furnace at temperature 850- 900°C to imitate the thermal incineration process, and the emission from the burning process was found to contain CO₂, CO, SO₂, NO, NO₂, NO_x and Cl₂. Then, each plastic wastes were combusted in a bomb calorimeter to analyze the calorific value. However, when the plastic wastes were mixed with the ratio of 1:1:1:1:1:1 and combusted in the bomb calorimeter, the calorific value was found to be 45.54 MJ/kg, much higher than biomass fuels with the range of 14.0 - 18.4 MJ/kg and similar range with LPG, gasoline and fuel oil. Therefore, a new technology should be invented to recover this waste and convert them into value-added energy.

Keyword: Waste management; Plastic waste; Calorific value; Energy