ENERGETIC CHARACTERIZATION OF LIQUID, SOLID, AND GASEOUS PRODUCTS DERIVED FROM PLASTIC PYROLYSIS

Balázs Hegedüs, Zsolt Dobó

Department of Energy, Ceramic- and Polymertechnology, Faculty of Materials and Chemical Engineering, University of Miskolc, H-3515 Miskolc, Hungary
e-mail: balazs.hegedus@uni-miskolc.hu

ABSTRACT

The escalating global demand for plastics and synthetic polymers highlights the need to develop technologies to address the environmental impact of waste accumulation. Pyrolysis presents a promising waste processing method. Among the products obtainable from pyrolysis are high carbon content coke, combustible gas, and hydrocarbon oil with a wide range of possible applications. In this study, the energetic characteristics of these products obtained from the pyrolysis of low- and high-density polyethylene (LDPE, HDPE), polypropylene (PP) and polystyrene and their blends were investigated. The liquid fraction was further separated to obtain a light hydrocarbon fraction with the boiling point of the components not exceeding the gasoline range (0-210 °C). The higher heating value (HHV) of all the pyrolysis products has been determined in addition to a commercially available gasoline sample to asses the energy potential of the pyrolysis-derived fuels. We found that pyrolysis oil possesses a greater HHV compared to traditional gasoline, which shows promise for plastic-derived fuels. Additionally the energy content of the pyrolysis gas surpasses that of natural gas, further highlighting the potential of pyrolysis as a sustainable and potentially economically viable waste processing method.

Keywords: plastic waste, pyrolysis, energy, fuel, sustainability