



“Gheorghe Asachi” Technical University of Iasi, Romania



EXPERIMENTAL INVESTIGATION ON THE HEAT OF COMBUSTION FOR SOLID PLASTIC WASTE MIXTURES

Liviu Costiuc^{1*}, Mircea Tierean², Liana Baltes², Silvia Patachia³

¹*“Transilvania” University of Brasov, Mechanical Engineering Department, 29 Eroilor Blvd., 500036 Brasov, Romania*

²*“Transilvania” University of Brasov, Materials Engineering and Welding Department,
29 Eroilor Blvd., 500036 Brasov, Romania*

³*“Transilvania” University of Brasov, Product Design, Mechatronics and Environment Department,
29 Eroilor Blvd., 500036 Brasov, Romania*

Abstract

The aim of this paper is to determine the heat of combustion of plastic wastes resulted from municipal solid waste, automotive shredder facility waste and building and construction waste. The plastic wastes have been separated by flotation technique using as flotation media: water, ethanol, their mixtures and magnetic fluid. Resulted fractions have been analyzed aiming to determine the most effective fraction from the heat of combustion point of view. The obtained results have been compared to those reported in the literature, with those calculated by oxygen consumption method and those proposed in this paper and calculated by weighted sum of combustion heat of components, aiming to allow its approximation for different fractions of polymeric wastes with known composition, avoiding the experimental measurements. Deviations of measured values of the heat of combustion from those obtained by theoretical calculation have been explained by the polymer degradation during their life cycle. The most effective fraction from calorific point of view is that containing polyolefins, but this fraction could be mechanically recycled. The present study evidenced that the heat of combustion of the plastic waste decreases after polyolefin extraction and the remaining density fractions can be effectively used for energy recovery of the plastic waste by incineration.

Key words: heat of combustion, oxygen bomb calorimetry, polyolefins, polymers waste, recycling

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* Author to whom all correspondence should be addressed: e-mail: lcostiuc@unitbv.ro; Phone: +40749521699; Fax: 0268410525