Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

MODELING AND OPTIMIZATION OF THE WASTE MICRONIZED PLASTICS RECOVERY BY TRIBOELECTROSTATIC SEPARATOR

Adel Benabboun[1,2], Yassine Bellebna[1,3*], Youcef Brahami[1], Amar Tilmatine[1]

[1]APELEC Laboratory, Djillali liabes University, faculty of Technology, Algeria
[2]Mustapha Stambouli University, Mascara, Algeria
[3]National Polytechnic School of Oran, Algeria

Abstract

Triboelectrostatic separation of millimeter-size particles is widely used in the recycling industry of plastics. However, the separation of micronized particles needs still improvement due to the aerodynamic forces of such small particles. This paper is aimed to carry out an experimental investigation of a triboelectrostatic separation process based on a pair of rotating disks supplied by two high-voltage DC supplies of opposite polarities. The granular samples used in this paper are composed of micronized white pure virgin PolyVinyl Chloride particles (WPVC) and gray PolyVinyl Chloride particles (GPVC) of average size 50 µm. Moreover, the methodology of experimental designs was used for the experimental modeling and optimization of the separation process. It was deduced that the separation recovery is efficient and depends on several factors: the high-voltage level, the rotating speed of the disks, the fluidization rate and inter-electrodes spacing. The results obtained showed that the applied voltage remains the most significant factor in the separation process. The best separation performance was obtained for an applied voltage of 20 kV and a disk rotation speed of 100 rpm.

Keywords: fluidized bed, plastic particles, recycling, tribo-electrostatic separation

Received: March, 2020; Revised final: July, 2020; Accepted: September, 2020

[*] Authors to whom all correspondence should be addressed: e-mail: yassinebellebna@yahoo.fr; Phone: +213 557072141; Fax: +21344790846