Evaluation of the efficiency of a scrubber Venturi in the collection of particulate matter smaller than 2.5µm emitted by biomass burning

M.A.M. Costa[1], B.M. Silva[1], S.G.C. Almeida[1], G. Donato, A.F. M. Costa[2], A. A. Cardoso[1] and K. J. Dussán[1]

[1]Universidade Estadual Paulista, UNESP, Campus of Araraquara - IQ, Brazil;
[2]University of Twente, Enschede, Netherlands
Corresponding author: maria.am.costa@unesp.br

Abstract The use of biomass as a relevant industry fuel relates to the emerging need of a technique able to efficiently remove pollutants originated from biomass burning. The general objective of this study was to evaluate the efficiency of a scrubber Venturi in the removal of particles smaller than 2.5 µm emitted by the controlled burning of sugarcane bagasse under different operating conditions. Sugarcane bagasse used as fuel. The firing was carried out in a pilot scale burner, with a scrubber Venturi used as control equipment. The scrubber Venturi has a rectangular geometry of 117 mm in throat length, 2.4 cm in width and 3.5 cm in height. Water was used as washing liquid. The liquid gas flow rates were 0.6, 0.7, 0.8 and 1.1. Sampling was performed by positioning portable isokinetic samplers before and after the Venturi, in addition to sampling the smoke plume by means of an 8 stage Andersen cascade impactor. The scrubber Venturi was very efficient in the MP collection larger than 2.5 µm and between 1.0 and 2.5 µm. Considering the liquid-gas flow ratios of 0.8 and 1.1 the efficiencies for the three stages were 71-98, 89-85 and 69-93% for stages 1, 2 and 3, respectively. Burning biomass emits particulate pollutants of less than 1 µm in high concentrations. The scrubber Venturi evaluated obtained good collection efficiency for fine particles.

Keywords: particulate matter, scrubber Venturi, biomass, control.