



“Gheorghe Asachi” Technical University of Iasi, Romania



---

## FRACTIONATION OF AGRICULTURAL WASTE BIOMASS BY MEANS OF INTEGRATED BIOREFINERY CONCEPT

Adrian Cătălin Puițel<sup>1\*</sup>, Gabriel Dan Suditu<sup>2</sup>, Mircea Teodor Nechita<sup>2</sup>, Dan Gavrilescu<sup>1</sup>

<sup>1</sup>“Gheorghe Asachi” Technical University of Iași, Faculty of Chemical Engineering and Environmental Protection  
“Cristofor Simionescu”, Department of Natural and Synthetic Polymers,

<sup>2</sup>“Gheorghe Asachi” Technical University of Iași, Faculty of Chemical Engineering and Environmental Protection  
“Cristofor Simionescu”, Department of Chemical Engineering  
73 Prof. D. Mangeron Blvd., 700050, Iasi, Romania

---

### Abstract

Separation of lignocellulosic biomass components aims to produce materials and chemicals by processing a widely available and renewable category of raw materials. Corn stalks represent an important category of agricultural waste which can be processed into papermaking pulp. An often mentioned disadvantage of corn stalk usage as raw material in pulping process is the high amount of hemicelluloses, considered responsible for the alkali consumption during pulping and poor results in sorted pulp yields. Hemicelluloses contained by corn stalks can be extracted in a fiber based biorefinery processing approach in which extractive preliminary treatments forego pulping. We have investigated the effect of autohydrolysis process parameters (temperature and process time) on: yield of obtained pulp, the mechanical strength of laboratory paper sheets and sugar and lignin content of autohydrolysis liquors. It was found that in autohydrolysis, moderate conditions - 120°C and up to 90 minutes of treatment- leads to improvements in sorted pulp yields with minor drops in total yield values. The decreases of mechanical strength may be considered acceptable within a limit of 25% loss compared with control sample. In comparison with control pulping, the total solid yield decreased for all pretreated samples. The autohydrolysis loss of material ranged from 12% to 25%, while the concentration of sugars reached 6.25g/L for glucose and 4.22 g/L for xylose oligomers.

*Key words:* corn stalks, lignin, mechanical strength, monosaccharaides, pulp

*Received:* June, 2020; *Revised final:* August, 2020; *Accepted:* January, 2021; *Published in final edited form:* March, 2021

---

\* Author to whom all correspondence should be addressed: e-mail: [puitelac@ch.tuiasi.ro](mailto:puitelac@ch.tuiasi.ro); Phone: +40 232 278683 / 2135; Fax: +40 232 271311