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ASSESSING ENVIRONMENTAL IMPACT: ORGANOSOLV EXTRACTION OF CELLULOSE PULP FROM WOOD WASTE

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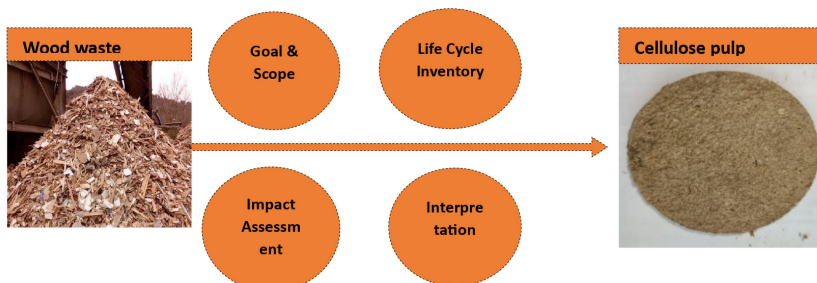
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Abstract – In the upcoming years, the paper industry is expected to rely on containerboard for packaging, with approximately 80 % of it being made from recycled fibers by 2020. Creating a new supply chain for fibers could help mitigate possible shortages. In this context, wood waste emerges as a valuable resource with the potential to serve as a plentiful and cost-effective reservoir for generating new materials such as cellulose fibers. This study presents an assessment of the environmental impact associated with the organosolv extraction of cellulose pulp from wood waste based on a previous in lab study conducted by the authors. The increasing demand for sustainable materials has prompted exploration into alternative methods for cellulose pulp production, with a focus on minimizing environmental footprint. Organosolv extraction, a promising technique, involves the use of organic solvents and acid catalysts to break down lignocellulosic biomass, resulting in high-quality cellulose pulp production. To evaluate the environmental implications of this process, a comprehensive life cycle assessment (LCA) approach was adopted. The LCA framework considers all stages of the organosolv extraction process, from wood waste collection to cellulose pulp manufacture, using a gate-to-gate approach. The functional unit for assessment is set as one ton of cellulose pulp. The dataset utilized for the LCA comprises primary data obtained from laboratory experiments, complemented by secondary data sourced from literature and the Ecoinvent life cycle inventory database. Furthermore, sensitivity analysis was conducted to assess the influence of key parameters on the environmental performance of the organosolv extraction process, with a focus on variations in energy consumption to identify potential areas for optimization and improvement. In summary, this study emphasizes the environmental aspects of utilizing organosolv extraction for cellulose pulp production from wood waste. Further research is warranted to explore energy consumption during the organosolv process for obtaining more precise data and optimizing the process. This could be achieved through pilot-scale experiments or utilizing process simulation software.

Keywords – Delignification, LCA (life cycle assessment); pulping; recycling



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