

Valorization of Biomass Waste Materials, a Biorefinery Concept

Fiber and textile waste valorization - towards environmental waste reduction

Baloyi, Rivalani B; Gbadeyan, OJ; Sithole, Bruce B; Chunilall, Viren

Abstract

The valorization of natural fibers and textile waste represents a promising approach to reducing environmental waste. This strategy involves converting waste materials into valuable products, promoting sustainability and resource efficiency. This chapter examines the technical feasibility of various textile recycling processes and assesses the challenges and limitations associated with each. A comprehensive analysis of various methodologies employed in the recycling and regeneration of fibers, extraction of cellulose, fermentation to bioethanol, pyrolysis, and conversion to other value-added products is discussed in detail. Additionally, the chapter offers insights into prospects and recommendations for establishing a sustainable economy for recycling textiles. The primary obstacles encountered in valorizing fibers and textiles encompass the substantial expenses associated with implementing valorization technologies, sorting and separation methodologies, and the limited yields attained during the processes. Consequently, a hierarchical strategy has been determined as the most effective approach for allocating each type of textile waste to the optimal valorization method, thereby facilitating the efficient retrieval of the preserved quality within the waste materials.