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Production of Bioethanol from solid wastepaper by Subsequent fermentation

Focusing on biomass energy as a green energy under the umbrella of green technologies bio-ethanol is one of the most important alternative energy sources that substitute the fossil fuels. Acceptable alternative, eco-efficient and sustainable method of bio-ethanol production is by the fermentation process from waste papers under the influence of microorganisms. Bioethanol production from wastepaper is the most appropriate and environmentally friendly need of the current time and is designed to apply a sustainable approach as a renewable source. As it not only contributes to overcoming energy deficiency and fuel burden but is also capable of recycling solid wastepaper together with reducing the greenhouse gas emissions in the best possible way. Our current study is done under controlled parameters in laboratory conditions.

The best conditions for acid hydrolysis of 10 g of wastepaper which was soaked in different amounts of H₂SO₄ (5% weight): 200 and 300 mL [98% sulfuric acid (by volume to water) was diluted to 5% concentration]. The mixture was placed in an autoclave at 121 °C. The influence of time on the process was determined in the range of 60-180 minutes. The whole fermentation process was operated under control parameters in between the temperature range of 20°C to 30°C, and the PH range from 4.5 to 5.5, at 700 to 800 rpm, and carbon source 15%. After the fermentation with *Saccharomyces cerevisiae*, 0.8 mL of Bioethanol/g was obtained. Finally, some properties were measured according to the standards and the obtained bioethanol conforms to the set limit. Based on the obtained results. it can be concluded that waste paper is a suitable raw material for bio-ethanol production. It was found that conversion of waste paper to ethanol plant was feasible from the economic point of view and can make multi-million dollar profit, with payback time being less than three years. Therefore, Ethanol production from wastepaper is doubtlessly an attractive business from economic and environmental point of view. This technology can be used as an alternative solution for sustainable waste management and material / energy recovery.

Keywords: Wastepaper, Hydrolysis, Fermentation, Distillation and Bio-ethanol, Biological Activation.