

Abstract

Nowadays, most biofuel is produced from high-sugar-content plants. The using of crop as feedstock may affect human consumption. The chemicals used in the recycling process such as eluents, bleachers also produce many pollutants. Meanwhile, research shows that newspaper has high cellulose content (about 62%). It is more suitable to convert to biofuel than cellulose-laden plants (40% cellulose content).

This project aims to study the feasibility of using the same methods processing the plants to derive biofuel from waste newspaper, so as to find an alternative way to manufacture biofuel and recycle newspaper.

In this project, only recyclable chemicals are considered. The solution produced during the experiments is also recyclable and little pollutant is released. 73% of the chemical used in the experiments is recycled. Three main steps are designed to process newspaper into ethanol: pretreatment, hydrolysis and fermentation. Pretreatment liberates the cellulose from the lignin seal and its crystalline structure. Experiments show that concentrated zinc chloride is not suitable for pretreatment. Diluted sulfuric acid and dilute sodium hydroxide are suitable. Cellulase and yeast are used respectively in hydrolysis and fermentation. The experimental results demonstrate that the best operation temperature for hydrolysis is 40°C. Finally, the yield of ethanol is determined using ethanol sensor. 10g newspaper can produce 2.53g ethanol. Percentage yield is 71.9%.

Further extension includes increasing the yield, using catalysts to speed up the reaction and optimising the procedures for the industry process to produce ethanol.