

## **Extraction of cellulose from cotton waste generated from Sri Lankan textile industries**

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### **Abstract**

Textile manufacturing is a major industry in the world. Cotton is the most abundant natural textile fiber. In the textile industry, cotton waste is generated from different processes. They are disposed to the environment which creates an adverse impact on environment. Due to their massive volume of production and high cellulose content, waste cotton textiles have strong potential of sustainable usage. In this study, cellulose was extracted from cotton waste which are collected from a textile factory located in Southern province. The collected cotton waste was cleaned and sterilized. The alkaline pulping, bleaching process and acid hydrolysis were followed to isolate cellulose from sterilized cotton waste. The pulping process was performed to remove lignin by keeping the sterilized waste cotton cloths in 10 wt.% sodium hydroxides (NaOH) followed by heating the mixture at 80°C for 3 h. Then bleached process was conducted to extract cellulose from pulped fiber using the hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>). That process was conducted for 15 minutes at 70°C. Eventually, bleached waste cotton cloths fibers were hydrolyzed using 64 wt.% H<sub>2</sub>SO<sub>4</sub> solution at 45°C for 1 h. The extracted cellulose was characterized using attenuated total reflection-Fourier transform-infrared spectroscopy (ATR-FTIR). According to the results, no peaks were observed that are attributed for hemicellulose and lignin and thereby verified complete isolation of cellulose. The cellulose yield was recorded as 79.79%. In this limited scope of study, it can be concluded that, waste cotton cloths are a valuable resource that can be utilized to produce cellulose.

**Keywords:** *Cellulose, Cotton waste, Hydrolysis, Pollution, Textile industry*