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Recovery of Lignin and Cellulose from Aquatic Weed (Water Hyacinth) †

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Abstract: Water hyacinth is available in huge quantities and widely spread aquatic weed. Although this is a notorious weed, it can be used for various applications if used judiciously. Water hyacinth is a rich source of lignocellulosic material. In the present study, the lignin content in water hyacinth has been determined by acid hydrolysis treatment (TAPPI 222). For extraction of lignin and cellulose, organosolve (80% ethanol) and alkaline treatment have been used to isolate lignin and cellulose. The lignin content has been found 16% in the stem of water hyacinth, whereas in pulp from organosolv process contains 9% lignin when treated with sulphuric acid—the results were obtained from different treatment methods. Organosolv process was carried out at three different temperatures 160 °C, 180 °C, and 210 °C in an autoclave at high pressures. The glass transition temperature of lignin ranges from 70 °C to 170 °C, depending on their specific structure and molecular weight. The recovery of lignin was 43.75% at 210 °C and 36 bar. Alkaline treatment of water hyacinth stem with 8% NaOH was carried out in an autoclave at 120 °C, and 160 °C, and 21.87% of lignin was recovered at 160 °C and 5 bar. For characterization of lignin, FT-IR was used, and the results resembled with literature.

Keywords: water hyacinth; lignin; cellulose; organosolv extraction; alkaline treatment.

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Conflicts of Interest

The authors declare no conflict of interest.