ABSTRACT

In present study, different pretreatment strategies were analyzed for delignification of sawdust to obtain improved enzymatic saccharification. These pretreatment strategies includes sodium hydroxide (10, 20, 30, 40 and 50%), calcium hydroxide (10, 20, 30, 40 and 50%), ammonia (10, 20, 30, 40 and 50%), nitric acid (2, 4, 6, 8 and 10%), phosphoric acid (2, 4, 6, 8 and 10%), acetic acid (2, 4, 6, 8 and 10%), hydrogen peroxide (2, 4, 6, 8 and 10%), autohydrolysis (15, 30, 45, 60 and 75 mins), microwave (1, 2, 3, 4 and 5 mins) and urea:thiourea (1:1, 1:2, 1:3, 1:4 and 1:5) pretreatment. Among these, maximum delignification (74.02 %) was obtained using 8% nitric acid pretreatment. This nitric acid pretreated biomass was subjected to cellulosic content estimation which revealed as 81.8%. Saccharification studies were carried out using thermophillic cellulases (Endo-1,4-β-glucanase, Exo-1,4-β-glucanase and β-1,4-Glucosidase) on nitric acid pretreated biomass. Different reaction parameters (effect of time, effect of temperature, effect of biomass concentration and cellulase units optimization) for saccharification were optimized. Maximum saccharification i. e. 34.61 % was obtained at 65°C using 250, 2550 and 70140 units of Endo-1,4-β-glucanase, Exo-1,4-β-glucanase and β-1,4- Glucosidase respectively employing 0.1 g pretreated substrate after an incubation time of 3 hours. This resulted in 1.82 folds increase in the saccharification after optimization. Moreover, structural variance in the untreated, pretreated and saccharified biomass was observed by scanning electron microscopy which shows structural disintegration in pretreated and saccharified biomass.