

### Bio-ethanol production in agitated conditions from waste from beer fermentation broth using a consecutive batch strategy

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In recent years, there has been a tremendous interest in the development of alternate and renewable sources of energy. In this regard, bio-ethanol is rapidly establishing as a worthy substitute. Our previous studies showed that waste from beer fermentation broth (WBFB) is a potential source for bio-ethanol production. The current study was designed to investigate the role of the supernatant and sediment from the WBFB for ethanol production. For this purpose, fermentations were carried out in a bioreactor in agitated conditions using a new consecutive batch strategy. The strategy comprised of using first only the supernatant followed by addition of sediment to the supernatant. Very high yields of ethanol were obtained with this method. At 50 rpm, the ethanol increased from initial 5% to 10.25% after 3h using the bare supernatant and then decreased. However, a drastic increase in ethanol production was observed from 9.52% at 5h to 21.90% after 7h of fermentation by addition of 3% sediment to the supernatant.