

Topic: Catalytic conversion of waste water from starch industry to γ -valerolactone

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ABSTRACT

γ -valerolactone (GVL) is considered to be one of the most attractive molecules from the derivative of levulinic acid, which can be efficiently used as solvent, liquid fuel, fuel additive and precursor for several novel polymers or alkanes. In this present work, levulinic acid was firstly produced by dehydration and rehydration of sugar-rich wastewater containing H_2SO_4 from starch industry. This study proposed feasibility of utilizing waste water that obtained from nano-crystalline process of starch factory as resource for the production of levulinic acid without catalyst adding. The highest yield of levulinic acid obtained from wastewater was 91.41 mol % at 140 °C with the reaction time of 240 min. As the next step, extraction and reactive extraction were employed to separate levulinic acid from aqueous mixtures contained H_2SO_4 . The highest extraction efficiency of levulinic acid from the aqueous mixtures containing the high acid concentration (H_2SO_4) by using 2-sec-butylphenol as extractant at 25 °C was about 70.0 %. For reactive extraction, the conversion of levulinic acid and yield of 2-buthyl levulinate ester were 87.04 % and 75.03 % by mol, respectively. Lastly, the possibility of production GVL from levulinate ester via catalytic tranfer hydrogenation was examined. The highest yield of GVL was 100% mol at 100 °C under 10 bar of nitrogen atmosphere.

Keywords: wastewater, renewable, levulinic acid, levulinate ester, γ -valerolactone