Immobilization of Sodium Hydrogen Sulfate Onto Silica and Study It's Catalytic Activity of Cellulose Hydrolysis

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Abstract In this study, silica extracted from rice husk ash (RHA) was immobilized with 3-chloropropyltriethoxysilane to form RHACCl. Sodium hydrogen sulfate reaction with RHACCl through two different method. Direct method was fabricating of $NaHSO_4$ with CPTES and sodium silicate in aqueous solution and the mixture was titrated via 3M HNO_3. Reflux method was fabricating $NaHSO_4$ with RHACCl under reflux conditions. The solid catalyst labeled as $(SiO_2)_2$-dir and $(SiO_2)_1$-ref respectively. Various spectroscopic methods well characterized the catalyst such as elemental analysis, TGA/DTA, FT-IR, N_2-adsorption desorption study, and TEM, SEM, XRD. Catalysts surface areas were found to be 273.9 m_2/gm and 307.3 m_2/gm for both SiO_2 $_{(2)}$-dir and SiO_2 $_{(1)}$-ref respectively. Both carbon and sulfur percentage were slightly high at catalyst prepared under reflux condition as compared with the direct method product. The functional groups of catalyst were not changed on the FT-IR in both catalysts. The thermal and morphology studies did not show too many changes on the catalyst in both methods. The XRD pattern of catalyst from direct method shows some crystallinity as compare with reflux method which show amorphous phase. Fast cellulose hydrolysis to monosaccharide followed by in-situ hydrolysis of formed monosaccharide over $NaHSO_4$. Up to 99 % of monosaccharide (which was mainly glucose) was formed as a result of cellulose hydrolysis in one hour and a half at 120 °C. In-situ glucose was deducted within three hours and a half from the starting point of hydrolysis in presence $NaHSO_4$ as homogenous catalyst. SiO_2 $_{(2)}$-dir was fully hydrolysis cellulose to glucose within 6 h. During the next 5 h of reaction, approximately 80% of glucose was in-situ hydrolysis. While $SiO_{2(1)}$-ref was hydrolysis 80% of cellulose within 7 h to glucose and after that 70% of glucose had in-situ hydrolysis within 4 h. Both RHA and RHACCl showed less than 25% of
cellulose hydrolysis within 5 h. Therefore the catalytic efficacy for catalysts through hydrolysis of cellulose to glucose and then in-situ hydrolysis for glucose that could be following the next gradient.
$NaHSO_4$ > SiO_2 $_{(2)}$-dir > SiO_2 $_{(1)}$-ref > RHACCl > RHA

Abstract

Corona virus disease is a worldwide disease spread in the end of 2019 that affected the diabetic patients. This clinical study deals with laboratory tests and results for coronavirus patients with or without Type 2 diabetes mellitus. Subjects are 160 divided into 40 controls, 40 subjects have type 2 diabetes mellitus, and 80 subjects have Covid-19, where 40 subjects with Type2 diabetes mellitus and 40 subjects without diabetes, all Covid-19 subjects were hospitalized patients. During the period between September 2020 to March 2021 in Al-Muthanna governorate. The age range of all subjects male or female ($\geq$ 45 years old). Blood samples were withdrawn after nearly 12 hours of overnight fasting to do the analysis of glucose, Renal function test, ALT, AST, Bilirubin, Ferritin, Albumin, CRP, WBC, Lymphocytes, HCT and Troponin. In this study, it was found that the level of glucose was high in patients with Covid-19 with or without diabetes, but it was higher in patients with diabetes, the same is shown for ferritin, C - reactive protein, LDH and WBC. The kidneys were also affected, since the level of urea and creatinine increased in patients with Covid-19 with or without diabetes. There was increased levels of liver enzymes (ALT, AST) but no change found in bilirubin level. There were a decrease in the level of albumin, lymphocyte and hematocrit for Covid-19 patients with diabetes. In contrast there is no change in Troponin level. Finally, coronavirus 2 infection might represent a worsening factor for patients with diabetes as a result of severe metabolic complications affected β-cell function.