

New silica supported HClO₄ as efficient catalysts for estolide synthesis from oleic acid

Abstract:

The syntheses of estolides via condensation reaction of oleic acid were investigated using heterogenous catalysts. In this study HClO₄ is supported onto suitable support to make it environmentally friendly. A series of solid acid catalyst containing 5-45 % of perchloric acid supported onto silica was synthesized and characterized using XRD, BET surface area measurement, TEM and XPS surface analysis. Silica modified with perchloric acid was found to be efficient and environmentally benign solid acid catalyst for estolide synthesis. The reaction was performed at 70 °C for 10 hours to give oleic-oleic monoestolide acid (m/z 563.51 as M-H)⁻. Based on the experimental findings above, optimum catalytic performance was with 15 % HClO₄ loading onto SiO₂ to give 98.98 % conversion of the oleic acid with 63.98 % oleic-oleic monoestolide acid selectivity.