Microwave assisted conversion of non edible seed cake into intermediate chemicals catalyzed by *p*-TSA acid activated clay in ionic liquid medium

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Non edible seeds are the potential sources of biofuels and intermediate chemicals. Production of biofuels generates huge quantity of seed cakes as waste. These cakes have limited application as they contain toxins. Seed cake being the rich source of cellulose serves as feedstock for conversion into biofuels and bio platforms molecules. Present work focuses to utilize non edible seed cake Soapnut (Sapindus mukorossi), Jotrapa (jatropha curcas) and Pongamia (Pongamia pinnata), and Neem (Azadirachta indica) to produce platform chemicals using green principles. Catalyst p-TSA activated clay dispersed in 1-ethyl-3-methylimidazoliumchloride ([EMIM]Cl) act as medium to this seed cake was added and microwave irradiated at temperature 90-120^{o}C for 30 minutes. Dissolution of seed cake was 9-12% and HMF (30-46%) was the major product. Un-dissociated seed cakes were separated by centrifuge as residue and reaction mixtures were subjected to product analysis. Microwave treated montmorillonite clay activated with p-TSA was characterized by cation exchange capacity (CEC), X-ray, BET analysis, Fourier transform infrared spectroscopy (FT-IR), temperature programmed desorption (TPD) of ammonia and cyclic voltammeter (CV) techniques and reaction product was quantified through FTIR and LC-MS. Cellulose in the seedcake interact with (EMIM) Cl disorders β –(1-4) linkage of glycosidic-oligomers of cellulose polymer chain and releases free glucose and *p*-TSA clay catalyst under microwave irradiation catalyses glucose to HMF and other intermediate compounds. *p*-Tolune sulphonic acid treated acts as a green catalyst for converting biomass into platform molecules. Separation and purification of the products from the reaction mixture and engineering reuse of ionic liquid to suite the industrial process are challenging task which are being worked out. Establishment of optimum conditions for rapid and maximum production of solid and liquid fine chemicals is being made. While there is still considerable scope for further development of conversion and yield of this process, the unique properties of the microwave, ionic liquids and acid activated clay catalyst offer several benefits for conversion of deoiled seed cake into biofuels and chemical intermediate.

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