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Conversion of waste coal fly ash into valuable catalysts and their applications for bio-energy production

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The present research work was undertaken while keeping in mind the green chemistry principles. The emphasis was on fly ash waste utilization, an efficient use of renewable resources and avoiding the use of toxic and / or hazardous materials to manufacture value added chemical products. When coal is subjected to combustion, it generates a lot of undesired ash which needs a large land area for its disposal. Moreover, it pollutes natural resources. The major percentage of fly ash is utilized for mine filling, bricks, tiles and cement manufacturing. So far, not much research efforts have been put on the fly ash utilization for the development of catalysts. In the present endeavor, an attempt has been made to synthesize sulfated fly ash (SFA) and Mordenite

type zeolite catalysts from waste coal fly ash. The composition of major and trace elements in the fly ash was identified using XRF analysis. Based on XRF results, the fly ash can be classified as Class F-type and its SiO₂/Al₂O₃ ratio was found to be 1.46. The catalysts were characterized by various techniques such as SEM, EDS, XRD, TGA, BET surface area, TPD-NH₃, SS NMR, etc. The developed catalysts were utilized for conversion of maize acid oil into biodiesel and biomass derived levulinic acid (LA) esterification. LA is an important biomass derived feedstock whereas, maize acid feed stock is waste obtained from refining of crude maize oil. The maximum biodiesel and LA conversion were found to be 98.25 % and 83 % respectively.

Biography

Kalpana C Maheria has completed Ph.D Applied Chemistry 2007 Applied Chemistry Department, Faculty of Tech. & Engg., The M. S. University of Baroda, Vadodara, Gujarat, India Thesis Title: "Synthesis, Characterization and Applications of Some Advanced Inorganic Materials Containing Tetravalent Metal Acid Salts". Research interest in Materials (Inorganic and Hybrid) synthesis, characterization and their applications, Heterogeneous Catalysis (Zeolites and Mesoporous materials)

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