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Response surface methodology: An optimistic tool for the optimization of process parameters in biodiesel production

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The traditional processes have been applied for production of biodiesel are based on basic catalysts and necessitates moisture free conditions and also feed stocks with lower levels of free fatty acid contents. Alkaline catalysts reveal the higher reaction rate than acidic catalysts. However, the alkaline catalysts involved soap formation of free fatty acid leading to the deactivation of catalysts and impart high production cost. Therefore, the work was investigated to synthesize biodiesel fuel via transesterification of waste cooking oil over silica melamine trisulfonic acid as an efficient, recoverable and recyclable solid acid catalyst. The process variables that influence the biodiesel production, such as reaction temperature, reaction time, catalyst loading and methanol to oil molar ratio were investigated and optimized using RSM. Synthesized catalyst was fittingly characterized by FT-IR, NH3-TPD, BET, XRD and SEM analysis, whereas synthesized biodiesel fuel was duly characterized by FT-IR, 1H NMR and 13C NMR spectroscopic techniques.

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