Transesterification of rapeseed oil to biodiesel in supercritical methanol with different heterogeneous catalysts

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The synthesis of biodiesel fuel by transesterification of rapeseed oil in supercritical methanol using different heterogeneous catalysts was studied. The experiments were performed in batch reactors to investigate the effects of catalysts, reaction temperature, molar ratio of methanol to oil. After reactions, the contents of fatty acid methyl esters (FAMEs) and mono-, di-, triglycerides were analyzed by gas chromatography(GC). The characteristic of catalysts were analyzed by TEM, BET and XRD. To measure the yield of separation of catalysts, biodiesel samples were analyzed by ICP. A possible reaction mechanism was also suggested. FAMEs contents were enhanced compared with non-catalytic reaction. At low temperature, catalyst showed more significant change than at high temperature. The contents of FAMEs increased with increasing temperature and increasing molar ratio of methanol to oil. The surface area of catalysts showed similar area and the morphology of ZnO particles hardly changed after reaction.