Zirconia-based catalyst for the one-pot synthesis of coumarin through Pechmann reaction

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Abstract
Coumarins play an important role in drug development with diverse biological applications. Herein, we present the synthesis of coumarin through Pechmann reaction by using zirconia-based heterogeneous catalysts (ZrO2-TiO2, ZrO2-ZnO, and ZrO2/cellulose) in a solvent-free condition at room temperature. ZrO2-TiO2, ZrO2-ZnO, and ZrO2/cellulose were identified through spectroscopic techniques such as FESEM, X-ray, EDS, XPS, and FT-IR. ZrO2-TiO2 showed the best catalytic performance while ZrO2/cellulose was inactive. The kinetic parameters were observed in a solvent-free condition as well as in toluene and ethanol. The temperature effect was extensively studied which revealed that increasing the temperature will increase the rate of reaction. The rate of reaction in a solvent-free condition, ethanol, and toluene were 1.7 x 10(-3), 1.7 x 10(-2), and 5.6 x 10(-3) g mol(-1) min(-1), respectively.

Keywords
Author Keywords: Zirconia; Heterogeneous catalyst; Coumarin; Pechmann reaction; Kinetic study; Room temperature; Solvent-free condition
KeyWords Plus: ELECTRO-CATALYST; OXYGEN EVOLUTION; IONIC LIQUID; COBALT OXIDE; EFFICIENT; DERIVATIVES; ACID; NANOPARTICLES; CONSTRUCTION; CONDENSATION

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