

Simultaneous synthesis of biodiesel and zinc oxide nanoparticles using supercritical methanol

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Biodiesel and zinc oxide nanoparticles were synthesized simultaneously using supercritical methanol. Zinc nitrate was used as the source of zinc for the formation of the zinc oxide nanoparticles, which acted as a catalyst during the transesterification of rapeseed oil. In addition, the in situ formed zinc oxide nanoparticles led to a reduction in the reaction temperature and time. The fatty acid methyl ester (FAME) yields in the various biodiesels synthesized were determined using gas chromatography (GC). The zinc oxide nanoparticles formed were studied using X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), and Fourier transform infrared (FT-IR) spectroscopy. The results of these analyses confirmed the formation of surface-modified zinc oxide nanoparticles of sizes smaller than those obtained using conventional techniques. This newly developed method provides an economical advantage since it results in the lowering of the operational temperature and the production of zinc oxide as an additional byproduct.