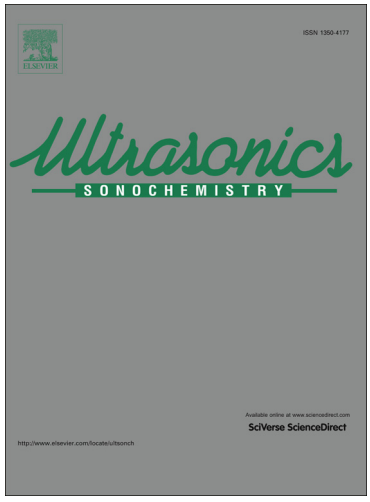

Green oxidation protocol: selective conversions of alcohols and alkenes to aldehydes, ketones and epoxides by using a new multiwall carbon nanotube-based hybrid nanocatalyst via ultrasound irradiation

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Green oxidation protocol: selective conversions of alcohols and alkenes to aldehydes, ketones and epoxides by using a new multiwall carbon nanotube-based hybrid nanocatalyst via ultrasound irradiation

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Abstract

In this work, design and development of a new economically-efficient and environmentally-benign sonochemical-assisted oxidation protocol by using multiwall carbon nanotubes (MWCNTs) and TiO_2 hybrid nanostructure catalyst is reported. The structure, morphology and particle size of the nanostructure catalyst and the products were characterized by various methods such as FT-IR, FE-SEM, EDX, XRD, DTA, GC and GC-MS analyses. The selective oxidations of alcohols to aldehydes, ketones and epoxidation were studied in the presence of MWCNTs/TiO_2 at room temperature under ultrasonic irradiation conditions in excellent conversions. This is the first design, preparation, characterization and application of the present nanomaterial and also the first ultrasound-irradiated green oxidation. This novel protocol offers several advantages such as environmentally-benign, high yields, selective oxidations, short reaction times, easily isolation of the products, simple preparation, recoverability and reusability of the nanocatalyst without significant decrease in its activity.

Keywords: Sonochemistry; Green ultrasonic-assisted oxidation; Multiwall carbon nanotube (MWCNTs)/TiO_2; Hybrid nanocatalyst; Alcohols.