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Transfer dehydrogenation of 1-phenylethanol over supported palladium nanoparticles under mild conditions

Reem AlBilali[1*] and **Nikolaos Dimitratos**[2]
[1]University of Dammam, Saudi Arabia
[2]Cardiff University, UK

An interesting alternative to aerobic conditions for the production of oxygenated products, such as aldehydes and ketones, can be the use of unsaturated organic molecule as a hydrogen acceptor, instead of molecular oxygen. In this case, the oxidative dehydrogenation is changed to transfer dehydrogenation, which overcomes the safety limitations of aerobic oxidation. In the majority of reported works, researchers represent the catalytic activity of supported metals such as palladium and ruthenium on the transfer dehydrogenation of alcohols. This work demonstrated the catalytic activity of supported palladium nanoparticles and the influences of different parameters, such as controlling particle size, changing the stabilizer, thermal treatment of the catalyst on the liquid phase transfer dehydrogenation of 1-phenyl ethanol as a model reaction under mild conditions. Varying catalyst loading, stirring rate, and the 1-Phenyl ethanol/palladium molar ratio have determined the different regimes. The apparent activation energy of 5%Pd/C was determined. Moreover, the influence of varying the stabilizer type, and concentration, during the synthesis of palladium nanoparticles via sol immobilization technique on the resulted particles, and their catalytic activity on the liquid phase transfer dehydrogenation of 1-phenyl ethanol was investigated. The chemical composition and morphology of the catalyst were determined using XRD, XPS, TEM and SEM-EDX. The results illustrated that the two main parameters which can mainly control the catalytic activity of the liquid phase transfer dehydrogenation of 1-phenyl ethanol are the ratio between metallic palladium to palladium oxide, and the particle size of the catalyst.

Biography

Reem Khalid AlBilali is an assistant professor in physical chemistry at the University of Dammam, Saudi Arabia since 2012. Her research interests are the synthesis and characterisation of supported metal nanoparticles and their catalytic applications, corrosion and corrosion inhibitions of metals and the adsorption of photoactive materials on clay surfaces. In September 2015, she joined Cardiff Catalysis Institute at Cardiff University, UK, as a postdoctoral researcher associate as she is still working there. AlBilali has many publications in both Arabic and English language, and she is a (MRSC) member in the Royal Chemical Society (RSC) and a member in the American Chemical Society, Saudi Chemical Society and the National Association of Corrosion Engineers (NACE).

ralblali@uod.edu.sa

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