Sonochemically Synthesized LaPO₄ Nanopowder and Its Catalytic Activity

Mehrdad POURAYOUBIᵃ*, Zohreh SHOBEIRIᵇ, Marko RODICᵇ and Vladimir DIVJAKOVICᶜ

ᵃ Department of Chemistry, Ferdowsi University of Mashhad, Mashhad, Iran
ᵇ Department of Physics, Faculty of Sciences, University of Novi Sad, 21000 Novi Sad, Serbia

pourayoubi@um.ac.ir, z.shobeiri@gmail.com

Up to now, some procedures have been developed for the synthesis of LaPO₄ salt, in the nano-scale,

[1] and we report here the preparation of LaPO₄ nanoparticles under ultrasonic irradiation by

using La(NO₃)₃.6H₂O and NaH₂PO₄.2H₂O in water/ethylene glycol. The morphology and average

particle size were studied by SEM-EDX and XRD. The SEM image showed uniformity in

morphology of the prepared LaPO₄ (Fig. 1), and the existence of lanthanum, phosphorous, and

oxygen atoms were confirmed by SEM-EDX analysis. XRD pattern of sample is in agreement

with monoclinic system of the LaPO₄ in P2₁/n space group (JCPDS 32-0493). The average grain

size, of 41 nm, was calculated by using Scherrer equation. The synthetic lanthanum phosphate

was used as a new heterogeneous and highly useful nano-catalyst for the synthesis of 3-(4-
nitrophenyl)-1-phenyl-3-(phenylthio)propan-1-one from the conjugate addition of thiophenol to p-
nitrochalcone. The product was characterized by single-crystal X-ray determination (Fig. 2), IR, ¹H

NMR, ¹³CNMR, elemental analysis and mass spectrometry. The low solubility of LaPO₄ salt in water and its

high thermal stability

[2] make it as a good candidate in catalytic applications.

Moreover, due to the presence of PO₄³⁻, the La³⁺ ion is oxophilic enough to form a strong coordinate bond with the

oxygen atom in a carbonyl compound. This is a suitable characteristic to activate Cₛ in the α,β-

unsaturated ketones giving the sufficiently electrophilic property required in the conjugate

addition considered in this work.

Fig. 1.

Fig. 2.

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