Iranian Journal of Physics Research, Vol. 22, No. 2, 2022
DOI: 10.47176/ijpr.22.2.61266

Enhancement of specific surface area of $CoFe_2O_4$ powders synthesized by KCl-assisted solution combustion: effect of KCl content and initial pH

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(Received 7 June 2021 ; in final form 26 December 2021)

Abstract

In the present study, the potassium chloride-assisted solution combustion method was used to synthesize cobalt ferrite nanoparticles. Potassium chloride salt was used as a specific surface enhancer and nitric acid was used as an auxiliary oxidizer and pH regulator. The simultaneous effect of the initial pH of the solution and the amount of added potassium chloride salt on the specific surface area, structural, microstructural and magnetic properties of synthetic powders were studied. X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infrared (FT-IR), Vibrating Sample Magnetometer (VSM) at room temperature and Brunnauer–Emmet–Teller (BET) method were used for those purposes. The results showed that the initial pH and the amount of potassium chloride salt had an interaction effect on the specific surface area of cobalt ferrite powders. Under optimal conditions, cobalt ferrite powders with high specific surface area of 87.77 m^2g^{-1} were successfully synthesized. Synthetic powders had mesoporous microstructure and hard magnetic behavior.

Keywords: cobalt ferrite, nanoparticles, magnetization, salt addition, solution combustion, specific surface area

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