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Effect of synthesis parameters on the size of cobalt ferrite crystallite

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Abstract

Nanoparticles of cobalt ferrite (CoFe_2O_4) were synthesized by the EDTA/Citrate complexing method and hydrothermal method without addition of surfactant. The influence of the pH of the reaction medium (8, 9 or 10), the temperature of the thermal treatment (600°C , 800°C or 1000°C for the EDTA/Citrate method, and 120°C , 140°C or 160°C for the hydrothermal method), and the duration of the thermal treatment (2, 4 or 6 hours for the EDTA/Citrate complexing method, and 6, 15 or 24 hours for the hydrothermal method) on the average crystallite size was studied by means of an experimental design based on the results obtained by XRD. Statistical analysis led to quantification of the influence of the synthesis parameters on the crystallite size of the powders. Results showed that the pH of the reaction medium is the parameter that shows the greatest influence on the growth of the crystallites of the powders obtained by the hydrothermal method, while calcination temperature is the most significant one for the powders produced by the EDTA/Citrate complexing method.

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