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INFLUENCE OF TIME AND TEMPERATURE IN THE MICROWAVE-ASSISTED HYDROTHERMAL TREATMENT OF MAGNETITE NANOPARTICLES

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Abstract. *Magnetite is an iron oxide that has been extensively investigated for its utilization in the development of drug delivery nanocarriers. Generally, magnetite nanoparticles are obtained through the chemical route of co-precipitation. However, since the outcome properties of the resulted nanoparticles are limited in terms of possibility to control the size and size distribution and to ensure the reproducibility of the synthesis process, unconventional synthesis routes are constantly investigated. Specifically, the microwave-assisted hydrothermal method represents an alternative with tremendous potential owing to the possibility of varying the treatment parameters, i.e., pressure, temperature, time. Thus, the present study aimed to investigate the influence of time and temperature upon the structural and physico-chemical properties of magnetite nanoparticles.*

Keywords: magnetite nanoparticles, microwave-assisted hydrothermal method, drug delivery
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1. Introduction

Iron oxides represent transition metal oxides that occur naturally in numerous polymorphs with varying stoichiometries and structures and have important roles in numerous geological and biological processes [1, 2]. Additionally, iron oxide nanoparticles possess unique properties, such as superparamagnetic behavior, high saturation magnetization, good dispensability, and biocompatibility [3]. Among them, magnetite (Fe_3O_4 or $FeO \cdot Fe_2O_3$) is one of the most intensively studied and applied forms owing to its unique magnetic properties that are of significant importance in medical and technological applications, such as such as separation

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