

Investigating the effect of temperature and time, and pH parameters on the particle size of hydroxyapatite using the hydrothermal method

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Abstract

Biomaterials are getting popular because of their numerous uses, including compatibility at the graft site. There are several forms of biomaterials, one of which is hydroxyapatite (HAP), which is frequently employed in medical sciences and scientific research. Hydrothermal synthesis of hydroxyapatite nanoparticles was used in this study. The chemical structure and shape of the produced hydroxyapatite powder were investigated using Fourier transform infrared spectroscopy (FTIR) and transmission electron microscopy (TEM). To identify the ideal conditions for the size of the synthesised hydroxyapatite nanopowder, the response surface method (RSM) with central composite design (CCD) is utilised. Three independent variables, such as pH, temperature, and time of hydrothermal treatment, were investigated in this design. The size of hydroxyapatite nanoparticles was shown to decrease under alkaline conditions. Furthermore, the pH factor has the significant influence on the size of hydroxyapatite powder nanoparticles, according to the analysis of variance (ANOVA).

Keywords: Hydroxyapatite; Response surface methodology; central composite design