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Solvothermal Synthesis of Calcium Hydroxyapatite via Hydrolysis of α -Tricalcium Phosphate in Different Aqueous-Organic Media

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Hydroxyapatite [$\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$, HAp] is a major inorganic component in hard tissue [1-3]. HAp is biocompatible and biodegradable substance with a great promise for bone regeneration [4]. It was observed that bone has a great affinity for implants containing high percentages of HAp [5].

In the present work, the effects of various organic solvents and solvothermal conditions on the formation of HAp via hydrolysis of α -tricalcium phosphate (α -TCP) were investigated. The hydrolysis reaction was performed in solutions with different water to organic solvent (W:O) ratios under solvothermal conditions at 120 °C for 3 h and at 200 °C for 5 h. Ethyl alcohol (EtOH), isopropyl alcohol (PrOH), and butyl alcohol (BuOH) did not inhibit the hydrolysis of α -TCP while methyl alcohol (MeOH) and ethylene glycol (EG) had a more prominent inhibitory effect on the formation of single-phased HAp. The samples treated with organic solvent only showed no evidence of HAp formation. This was true for all the organic solvents used under different solvothermal treatments. The morphology of the obtained samples varied from plate-shaped to rod-shaped. From all the solvents analysed, EG had the highest impact on the sample morphology.

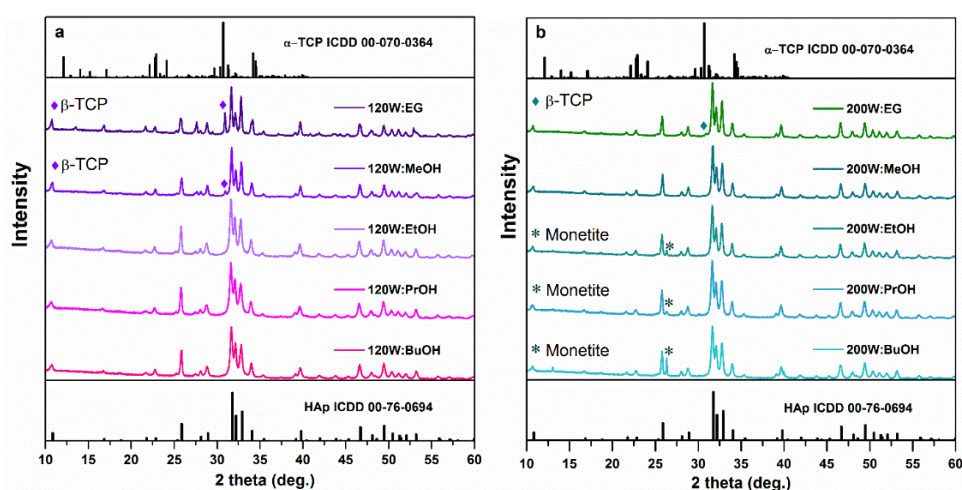


Figure 1. XRD patterns of the samples prepared using water to organic solvent ratio of 40:60 after solvothermal treatment at 120 °C for 3 h (a) and at 200 °C for 5 h (b).

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