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The effects of excess calcium on the handling and mechanical properties of hydrothermal derived calcium phosphate bone cement (Conference Paper)

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Abstract

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The objective of this study is to determine the effects of excess calcium on the handling and mechanical properties of hydrothermal derived calcium phosphate cement (CPC) for bone filling applications. Hydroxyapatite powder was synthesized via hydrothermal method using calcium oxide, CaO and ammonium dihydrogen phosphate, $\text{NH}_4\text{H}_2\text{PO}_4$ as the calcium and phosphorus precursors respectively. The effects of calcium excess were evaluated by varying the CaO content at 0, 5 and 15 mole %. The precursors were then refluxed in distilled water at 90-100°C and dried overnight until the calcium phosphate powder was formed. CPC was then produced by mixing the synthesized powder with distilled water at the powder-to-liquid (P/L) ratio of 1.5. The result from the morphological properties of CPC shows the increase in agglomeration and particles size with 5 mole % of calcium excess but decreased with 15 mole % of calcium excess in CPC. This result was in agreement with the compressive strength result where the CPC increased its strength with 5 mole % of calcium excess but reduced with 15 mole % of calcium excess. The excess in calcium precursor also significantly improved the setting time but reduced the injectability of CPC. © Published under licence by IOP Publishing Ltd.

Indexed keywords

Engineering controlled terms: Bone Bone cement Calcium phosphate Compressive strength Hydroxyapatite Lime Manufacture Mechanical properties

Compendex keywords Ammonium dihydrogen phosphate Calcium phosphate bone cement Calcium phosphate cement Distilled water Hydrothermal methods Hydroxyapatite powder Morphological properties Synthesized powder

Engineering main heading: Calcium

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