Incorporation of Poly(Vinyl Alcohol) for The Improved Properties of Hydrothermal Derived Calcium Phosphate Cements

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INDONESIAN JOURNAL OF CHEMISTRY
Volume: 18 **Issue:** 2 **Pages:** 354-361
DOI: 10.22146/ijc.29746
Published: MAY 2018
Document Type: Article

Abstract

Calcium phosphate cement (CPC) has been synthesized via a straightforward hydrothermal route. Calcium oxide and ammonium dihydrogen phosphate were used as calcium and phosphate precursors. The precursors were refluxed in distilled water at 90-100 degrees C and dried overnight until the calcium phosphate powder was formed. CPC was then produced by mixing the powder and distilled water at the powder-to-liquid (P/L) ratio of 1.5. Poly(vinyl alcohol) (PVA) of 1 to 7% (w/w) was added and its effect on physical properties was investigated. It was proved that PVA addition up to 7% (w/w) has shortened the setting time but decreased the injectability. The PVA free CPC has the initial and final setting times of 71 and 187 min, respectively and the injectability of 99.92%. The compressive strength also increased with the amount of PVA added in CPC. In addition, soaking CPC in Ringer's solution for 7, 14 and 21 days also gave remarkable effects on cohesion, microstructure and mechanical properties of the cement.

Keywords

Author Keywords: calcium phosphate cement; hydrothermal method; poly(vinyl alcohol); setting time; injectability
KeyWords Plus: IN-VITRO DEGRADATION; MECHANICAL-PROPERTIES; HYDROXYAPATITE; BONE; TEMPERATURE; FABRICATION; STRENGTH; FILM

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Funding

Funding Agency	Grant Number
Ministry of Higher Education (MOHE)	FRGS15-246-0487

View funding text

Publisher

GADJAH MADA UNIV, DEPT CHEMISTRY, JALAN PANCASILA, YOGYAKARTA, 55281, INDONESIA

Categories / Classification

Research Areas: Chemistry
Web of Science Categories: Chemistry, Multidisciplinary

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1 of 1

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