

## **PENGARUH RASIO MOLAR Ca/Si PADA KARAKTER KOMPOSIT HIDROKSIAPATIT TERKUATKAN PARTIKEL SILIKA**

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### **INTISARI**

Sintesis dan karakterisasi hidroksiapatit (HA) dan komposit hidroksiapatit (HA/SiO<sub>2</sub>) terkuatkan partikel silika (SiO<sub>2</sub>) menggunakan metode presipitasi telah dilakukan. Tujuan dari penelitian ini yaitu menyelidiki pengaruh rasio molar Ca/Si terhadap sifat komposit HA/SiO<sub>2</sub> yang meliputi luas permukaan, volume pori, ukuran pori, dan kekuatan mekanik (kuat tekan).

Sintesis dilakukan dengan prekursor Ca(NO<sub>3</sub>)<sub>2</sub>·4H<sub>2</sub>O, NaH<sub>2</sub>PO<sub>4</sub>·H<sub>2</sub>O, dan *silica fume* sebagai sumber partikel silika dengan variasi rasio molar Ca/Si pada suhu kamar (25°C) dan pH 10. Hasil sintesis sebagian dikompaksi, lalu dikalsinasi pada 900 °C selama 2 jam dan selanjutnya dikarakterisasi dengan spektrofotometer FTIR, XRD, SEM-EDX, SAA, dan UTM.

Hasil penelitian menunjukkan bahwa penambahan partikel silika optimum pada rasio molar Ca/Si 15 (HA/SiO<sub>2</sub> 15). Berdasarkan analisis adsorpsi metode DFT, komposit HA/SiO<sub>2</sub> 15 memiliki luas permukaan, volume pori, dan ukuran pori terbesar yaitu masing-masing 19,37 m<sup>2</sup>/g; 0,0817 mL/g; dan 33,24 nm. Penambahan partikel silika mengubah porositas dari mikropori menjadi mesopori sedangkan penambahan partikel silika tidak berpengaruh secara signifikan pada kuat tekan.

Kata kunci: komposit hidroksiapatit, presipitasi, uji mekanik, *silica fume*

***THE EFFECT OF Ca/Si MOLAR RATIO ON PROPERTIES  
OF THE SILICA PARTICLES REINFORCED  
HYDROXYAPATITE COMPOSITE***

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**ABSTRACT**

Synthesis and characterization of hydroxyapatite (HA) and hydroxyapatite composite (HA/SiO<sub>2</sub>) reinforced by silica particles (SiO<sub>2</sub>) with precipitation method have been carried out. The purpose of this study was to investigate the effect of Ca/Si molar ratio on HA/SiO<sub>2</sub> composite properties including surface area, pore volume, size volume, and compressive strength.

Synthesis was carried out by using Ca(NO<sub>3</sub>)<sub>2</sub>·4H<sub>2</sub>O, NaH<sub>2</sub>PO<sub>4</sub>·H<sub>2</sub>O, and silica fume as precursors with various Ca/Si molar ratios at room temperature (25 °C) and pH 10. The results were compacted and calcined at temperature of 900 °C for 2 hours, then characterized with FTIR spectrophotometer, XRD, SEM-EDX, SAA, and UTM.

Synthetic results indicated that optimum addition of silica fume occurred when the ratio of Ca/Si was 15 (HA/SiO<sub>2</sub> 15). Based on adsorption analysis with DFT method, a ratio of 15 yielded largest surface area, pore volume, and size volume with the value of 19.37 m<sup>2</sup>/g, 0.0817 cc/g, and 33.24 nm, respectively. The addition of silica particle changed porosity from micropores to mesopores, whereas the addition of silica particle did not significantly effect on compressive mechanical strength.

Keywords: hydroxyapatite's composite, mechanical test, precipitation, silica fume