

ABSTRAK

PEMBUATAN HIDROKSIAPATIT (HAP) SINTETIK MENGGUNAKAN PENDISPERSI ETANOL DALAM RUTE *SOL-GEL* DAN PASTANYA SEBAGAI BIOMATERIAL PADA UJI REMINERALISASI PADA GIGI AKIBAT PERLAKUAN ASAM SITRAT

Hidroksiapatit (HAP) merupakan material biokeramik, yang mana HAP banyak digunakan dalam bidang ortopedi dan gigi. Dalam penelitian ini, HAP digunakan sebagai bahan untuk uji remineralisasi mineral-mineral yang telah larut dalam enamel gigi akibat demineralisasi oleh asam. Dalam penelitian ini kami melakukan sintesis hidroksiapatit menggunakan Ca(OH)_2 dan H_3PO_4 dengan metode *sol-gel*. Masing-masing prekursor dilarutkan dengan etanol 99%. Sintesis hidroksiapatit diawali dengan pencampuran prekursor Ca(OH)_2 dan H_3PO_4 . Kemudian dilakukan proses *aging* selama 24 jam. Selanjutnya, sampel hidroksiapatit dikeringkan di dalam *oven* kemudian dikalsinasi. Pengujian karakteristik sampel Hidroksiapatit menggunakan XRD, XRF, dan PSA. Hidroksiapatit dibuat dalam sediaan pasta untuk proses uji remineralisasi. Pasta HAP ini dioleskan pada permukaan gigi premolar yang telah terdemineralisasi oleh asam sitrat, yang mana pengolesan pasta dilakukan selama 1 jam dan perlakuan diulangi selama 14 hari. Berdasarkan hasil XRD, XRF dan PSA menunjukkan terbentuknya kristal hidroksiapatit ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) dengan kemurnian 98,5% dan adanya pengotor berupa Kalsium (Ca) sebanyak 1,5%, memiliki rasio 1,93 dan ukuran partikelnya 399,2 nm. Berdasarkan uji SEM untuk sampel gigi menunjukkan bahwa morfologi permukaan gigi yang terdemineralisasi oleh asam membentuk lubang-lubang mikro yang menandakan mineralnya telah larut, sedangkan setelah proses remineralisasi, lubang-lubang mikro pada permukaan gigi telah tertutup.

Kata-kata kunci: Hidroksiapatit; demineralisasi; remineralisasi; sintesis; *sol-gel*

ABSTRACT

MANUFACTURING SYNTHETIC HIDROKSIAPATIT (HAP) USING ETHANOL DISPERSPERATION IN THE SOL-GEL AND ITS PASTE ROUTE AS A BIOMATERIAL IN REMINERALIZATION TEST IN TOOTH DUE TO CITRIC ACID TREATMENT

Hydroxyapatite (HAP) is a bioceramic material, which HAP is widely used in the orthopedic and dental fields. In this study, HAP was used as a material for the remineralization test of minerals that had dissolved in tooth enamel due to demineralization by acid. In this study, we synthesized hydroxyapatite using $\text{Ca}(\text{OH})_2$ and H_3PO_4 with the sol-gel method. Each precursor was dissolved in 99% ethanol. The synthesis of hydroxyapatite was started by mixing $\text{Ca}(\text{OH})_2$ and H_3PO_4 . Then the aging process is carried out for 24 hours. Next, the hydroxyapatite sample was dried in an oven and then calcined. Testing the characteristics of Hydroxyapatite samples using XRD, XRF, and PSA. Hydroxyapatite is made in paste preparations for the remineralization test process. This HAP paste was applied to the surface of the premolars that had been demineralized by citric acid, where the paste was applied for 1 hour and the treatment was repeated for 14 days. Based on the results of XRD, XRF and PSA showed the formation of crystals of hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) with a purity of 98.5% and the presence of impurities in the form of Calcium (Ca) as much as 1.5%, has a ratio of 1.93 and particle size 399,2 nm. Then based on SEM results for tooth samples showed that the morphology of the tooth surface demineralized by acid formed a microcavity which indicated the minerals had dissolved, whereas after the remineralization process, the microcavity on the tooth surface was closed.

Keywords: Hydroxyapatite; demineralization; remineralization; synthesis; sol-gel