THE EFFECT OF SIMULATED BODY FLUID (SBF) ON COMMERCIAL WOLLASTONITE/CHITOSAN COMPOSITE CEMENT SCAFFOLD

NUR LIYANA BINTI ABD HALIM

BACHELOR OF SCIENCE (Hons.) CHEMISTRY WITH MANAGEMENT
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

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ABSTRACT

THE EFFECT OF SIMULATED BODY FLUID (SBF) ON COMMERCIAL WOLLASTONITE/CHITOSAN COMPOSITE CEMENT SCAFFOLD

Wollastonite ($CaSiO_3$) composite cement scaffold is a biomaterial structure designed for use in biomedical applications, particularly in tissue engineering and regenerative medicine. Chitosan, a natural biopolymer derived from chitin was incorporated with the wollastonite as it is biodegradable, allowing the scaffold to gradually degrade over time as new tissue forms. The synergistic combination of these materials was prepared in order to study the effect of the composite cement scaffold when immersed in the SBF solution. The SBF solution which mimics the ionic content in human blood plasma was synthesized in lab using Kokubo method. The scaffold's response to SBF immersion is analyzed concerning degradation rate, pH changes and changes in physical structures. Experimental methodologies include soaking the scaffold in SBF solution for 2 weeks, followed by characterization through SEM-EDX and FTIR instrumentation. Initial findings suggest a correlation between immersion time and scaffold degradation, with leaching potential and alkalinity influencing weight loss. Furthermore, the study examines the changes in pH values of the scaffold during immersion period, shedding light on potential applications in regenerative medicine. The IR spectra showed significant peaks of PO_4^{3-} which indicates the presence of hydroxyapatite and the SEM-EDX illustrated porous structure and the formation of hydroxyapatite on the surface material with an increase of Ca/P value from day 3 to day 14. These results demonstrate that the incorporation of wollastonite powder with chitosan solution is effective in improving the bioactive and biodegradable properties of the scaffolds when immersed in SBF. This research contributes in understanding the biomaterial's behavior in simulated physiological conditions, guiding its optimization for biomedical applications.