ABSTRACT

Bone defects are conditions characterized by the loss of bone structure, often requiring tissue engineering approaches such as scaffold application. Hydroxyapatite (HA) is widely used due to its biocompatibility and osteoconductive properties. This study investigates the effect of varying HA concentrations (10%, 40%, and 70%) on the properties of scaffolds fabricated using the sponge replication method. The scaffolds were characterized using XRD to analyze crystal structure, dimensional analysis to evaluate structural stability, degradation tests in PBS for 7 days, and SEM-EDX to observe surface morphology and chemical composition. The results indicated that both 40% and 70% HA concentrations successfully formed crystalline HA phases, with interconnected porous structures and appropriate degradation rates for bone regeneration applications. The 70% HA scaffold demonstrated better porosity and structural stability, making it more suitable for bone defect repair applications.

Keywords: *Bone defects, scaffold, hydroxyapatite, sponge replication method, bone regeneration.*