

Studies on the potential of waste soda lime silica glass in glass ionomer cement production

ABSTRACT

Glass ionomer cements (GIC) are produced through acid base reaction between calcium-fluoroaluminosilicate glass powder and polyacrylic acid (PAA). Soda lime silica glasses (SLS), mainly composed of silica (SiO_2), have been utilized in this study as the source of SiO_2 for synthesis of Ca-fluoroaluminosilicate glass. Therefore, the main objective of this study was to investigate the potential of SLS waste glass in producing GIC. Two glasses, GWX 1 (analytical grade SiO_2) and GWX 2 (replacing SiO_2 with waste SLS), were synthesized and then characterized using X-ray diffraction (XRD) and energy dispersive X-ray (EDX). Synthesized glasses were then used to produce GIC, in which the properties were characterized using Fourier transform infrared spectroscopy (FT-IR) and compressive test (from 1 to 28 days). XRD results showed that amorphous glass was produced by using SLS waste glass (GWX 2), which is similar to glass produced using analytical grade SiO_2 (GWX 1). Results from FT-IR showed that the setting reaction of GWX 2 cements is slower compared to cement GWX 1. Compressive strengths for GWX 1 cements reached up to 76 MPa at 28 days, whereas GWX 2 cements showed a slightly higher value, which is 80 MPa.

Keyword: SLS glass; Glass polyalkenoate cement; Glass ionomer cement; Dental cement.