Modified Sodium Potassium Calcium phosphate glasses

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Abstract

This work reports on the effect of substituting SiO2, B2O3, Fe2O3 or Al2O3 for P2O5 in the ternary 0.20 CaO 0.13 K2O 0.13 Na2O 0.54 B2O3 glass system, compositions being potentially of interest for bio-medical or glass fertilizers applications. Different properties are analyzed here: density, coefficient of thermal expansion, glass transition temperature, thermal stability as well as dissolution behavior in water. It is shown that small addition of Fe2O3 or Al2O3 are both extremely effective in improving the glass resistance toward water degradation, increasing also the glass transition temperature, the density and decreasing the coefficient of thermal expansion. In contrast, addition of SiO2 and B2O3 have smaller impact on glass resistance toward water, either increasing or slightly increasing it. Non-linear change in density and glass transition with SiO2 and B2O3 small substitution for P2O5 are also observed.

Keywords: bioglass, phosphate glasses, water resistance

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