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Structural origins of Weathering stability in Sodium Aluminum Phosphosilicate glasses: results from multinuclear solidstate NMRECKERT, H.¹; SANTOS, M. L.¹; YAMAZAKI, H.¹; NAKANE, S.; IKEDA, H.

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Quaternary sodium aluminophosphosilicate presents many important applications as the use of glassy optical fibers,(1) already vastly used in energetic industry and as infrastructure basis. The characterization of amorphous materials using Nuclear Magnetic Resonance (NMR) enables the construction of a solid and explanatory structure model for the glasses, promoting a microscopic elucidation of their macroscopical effects. Structural studies show an improvement of mechanical and thermal proprieties when hexacoordinate silica or aluminum in higher a coordination species are found in the network.(2-3) Also, higher hydrolytic stability possibly relates with less P-O-P linkages.(1) To extend the knowledge about these glasses, we propose to comprehensively study of the structural origin of these properties use multinuclear single- and double resonance. The silicon is four-coordinated and successfully competes with phosphate, substituting the P-O-P linkages by P-O-Si. The hexacoordinated species are suppressed by the strong interaction between phosphorus and aluminum, which coordination number varies between 5.88 e 5.64. The double resonance experiments $^{31}\text{P}(^{23}\text{Na})$ e $^{31}\text{P}(^{27}\text{Al})$ validate the deconvolution of metaphosphate in two distributions, which points that phosphorus resonating in higher frequencies are stronger balanced by sodium and lower frequency stronger balanced by aluminum. Further experiments are being conducted in our laboratory in order to correlate the Raman spectra with the NMR. The changes in the physical chemical proprieties are suggested to be due the difference in the structure caused by the network formers playing different roles in connections expressed by Si-O-P, P-O-P, P-O-Al and P-O-P.

Palavras-chave: Aluminophosphosilicate. Spectroscopy. Nuclear magnetic resonance. Solid state. Weathering stability.

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