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Fluoride sites in aluminosilicate glasses: High-resolution ^{19}F NMR results

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ABSTRACT

We present here high-resolution, ^{19}F NMR spectra, collected with sample spinning rates to 25 kHz, for sodium and calcium silicate and aluminosilicate glasses. Several distinct fluoride ion sites are well resolved and can be assigned to various coordination environments based on clear similarities to crystalline model compounds. In aluminosilicates, fluoride with one Al and several Na or Ca neighbors predominate, but silicon-fluoride groups may also be significant. Small concentrations of the latter can also be detected in sodium silicate glasses, suggesting a possible role in reduction of viscosity. Fluoride sites with no Si neighbors are, however, predominant in Al-free sodium silicates and probably in Ca silicates as well.