Feasibility of the determination of fluorine in glass samples by high-resolution continuum source molecular absorption spectrometry

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The development of optoelectronic devices and systems for telecommunications, sensing and miscellaneous applications has stimulated intense research on vitreous materials. Since the discovery of the heavy metals fluoride glasses by Poulin [1] in 1974 numerous researches on fluoride and, more generally, halide glasses, resulting in the description of hundreds of new glass forming systems mainly based on ZBLAN glass and its variations. These new class vitreous compositions caused a huge range of possibilities technological applications, including the manufacture of optical fibers, lasers, and optical amplifiers when these matrices were doped with elements. However during the glass preparation step it's believe that it might have an equilibrium concentration of fluorine in the melt appropriate to and dependent on the temperatures as well as on the nature and composition of the glass base. Once melted, the fluorine could be lost until the equilibrium content of the fluorine is attained, then the net result is that the fluorine content as experimentally determined is less than theoretical value of batch composition. In this work, the development of the method for the determination of fluorine in glass samples was studied by molecular absorption spectrometry. The diatomic molecule of AlF was monitored at 227,4613 nm generated in C_2H_2-N_2O flame using high-resolution continuum source molecular absorption spectrometry. The effects of AlF wavelength, burner height, fuel rate and amount of Al on the accuracy, precision and sensitivity were investigated and optimized. The AlF absorption band at 227.4613 nm with 1 pixel was found to be the most suitable analytical line with respect to sensitivity and spectral interferences. The sample preparation in alkaline medium was compared with the acid decomposition by microwave energy for the decomposition of the glass samples.

References:
1 Poulain M.; Poulain, M.; Lucas, J.; Brun, P.; *Mater. Res. Bull.* 1975, 10, 243-246.

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