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A spreadsheet for calculating normative mole fractions of end-member species for Na-Ca-Li-Fe^{2+}-Mg-Al tourmalines from electron microprobe data

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Abstract

This work presents a spreadsheet that calculates the mole fractions of end-member components for simple Na-Ca-Li-Mg-Fe^{2+}-Al tourmalines from electron microprobe data. The input includes the B_2O_3 concentration obtained either from direct analysis or by estimation on the basis of stoichiometry. The concentration of Li_2O can either be input from other analysis or estimated by the spreadsheet. The spreadsheet does not address the mole fractions of Cr, V, oxidized or deprotonated tourmaline species, nor account for species involving tetrahedral boron or aluminum. Therefore, the spreadsheet is not a comprehensive tool that includes all IMA approved tourmaline species, and so is not intended for naming tourmalines according to IMA convention. The present method includes a useful subset of end-member species that can be described simply from electron microprobe data and so, akin to a normative mineralogical analysis for rock composition, the calculations are intended to provide a normative result that serves as simple basis for comparing tourmalines that is more direct than names derived from the most abundant species present.

Keywords: Tourmaline, formula, mole fractions, end-members, electron microprobe analysis