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INFLUENCE OF NON-ANALYZED LIGHT ELEMENTS ON RESULTS OF ELECTRON MICROPROBE

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The electron microprobe (EMP) has become a common analytical technique in geosciences over last three decades. The EMP analysis is based on measuring of characteristic X-rays generated during interactions of accelerated electrons with a sample. The measured characteristic X-ray has to be corrected by a function including various factors such as atomic number of the sample, absorption and fluorescence effects. For accurate matrix correction calculations is crucial to set the exact composition of analyzed phase. The modern EMP machines automatically process the measured intensities of characteristic X-rays by a matrix correction procedure taking into account chemical composition of the sample, e.g. PAP (POUCHOU & PICHOIR, 1984) and φ-(ϱz) (MERLET 1994). During a "common" EMP analysis, fluorine and heavier elements are usually measured and O content (in oxide phases) is calculated by a valence and all these elements are automatically involved into the matrix corrections. A higher content of B, C, Be, Li and H in minerals should be involved in to the matrix corrections as well, because the incomplete input dataset for the matrix correction calculations leads to an incorrect final analytical results. To optimize the matrix corrections and consequently analytical output, it is important to: 1) include the non-analyzed oxides of light elements (H_2O, CO_2, B_2O_3, BeO, Li_2O) into matrix corrections of analyzed minerals, 2) set the right O content in minerals with high halogen content (e.g. topaz $Al_2SiO_4F_2$). An electron microprobe analysis of tourmaline and topaz proceeded by φ-(ϱz) matrix correction routine (MERLET, 1994) excluding and including of non-analyzed elements are shown in Table 1.

	SiO_2	Al_2O_3	MgO	FeO	Na_2O	F	B_2O_3	H_2O	Total	Si	Al	Mg	Fe	Na	F
1a*	37.43	33.60	6.67	6.54	2.24	1.24	n.i.	n.i.	87.72	6.000	6.350	1.595	0.879	0.696	0.626
1b*	36.74	33.69	6.78	6.61	2.29	1.31	10.63	2.68	100.73	6.000	6.484	1.653	0.903	0.723	0.675

	SiO_2	Al_2O_3	F		Total	Si	Al	F
2a	32.78	56.85	20.5		110.13	1.000	2.043	1.978
	Si	Al	F	O	Total	Si	Al	F
2b	17.29	26.64	10.81	n.i.	54.74	1.000	1.604	0.925
2c	15.51	29.83	19.32	35.34	100.00	1.000	2.001	1.842

* contains also 0.10 CaO and 0.24 TiO_2
n.i. -not involved in to matrix corrections
used conditions: 15kV, 10 nA, 8 μm dia.
standards: Si,Al-sanidine, Mg-olivine, Fe-almandine, Na-albite, F-topaz

Table 1. Influence of non-analyzed elements on the on results of the EMP analysis. 1a*-analysis of tourmaline (in wt.% ox.), 1b*-the same analysis of tourmaline including 3.3 wt.% B and 0.3 wt.% H involved in matrix corrections. 2a- analysis of topaz (in wt.% ox.), 2b-the same analysis of topaz (in wt.% elm.), O not determined, 2c- the same analysis of topaz (in wt.% elm.), O (up to 100 wt.%) involved in matrix corrections. Tourmaline and topaz formula was calculated on the basis of Si = 6 and 1, respectively.

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