TABLE 2. Chemical composition of investigated tourmaline samples

	AT6	AT7	AT9	AT10	AT11	AT13	AT14	AT16	AT17	AT18	AT19	AT20	AT21	AT23	AT25	AT28	AT47
Na	0.401	0.370	0.576	0.512	0.558	0.508	0.431	0.298	0.420	0.207	0.255	0.192	0.208	0.222	0.550	0.604	0.276
K	---	---	---	---	---	---	0.004	0.002	0.002	0.002	0.004	0.002	0.002	0.004	0.004	---	0.004
Ca	0.342	0.542	0.022	---	0.049	0.421	0.240	0.617	0.485	0.719	0.633	0.750	0.695	0.714	0.158	0.022	0.600
Vacancy	0.257	0.088	0.402	0.488	0.393	0.071	0.325	0.083	0.093	0.072	0.108	0.056	0.095	0.060	0.288	0.374	0.120
Sum X	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Li	1.366	1.416	0.903	1.272	1.541	---	0.331	1.630	1.287	1.771	1.798	1.822	1.848	1.734	1.336	1.087	1.639
Mg	---	---	---	---	---	2.892	0.002	---	0.024	0.001	---	0.001	0.001	0.001	0.005	---	---
Ti^{4+}	---	---	---	---	---	0.118	0.002	---	0.033	---	---	---	---	---	---	---	0.001
V^{3+}	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cr^{3+}	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mn^{2+}	0.007	0.084	0.009	0.007	0.064	0.000	0.001	0.020	0.117	0.026	0.015	0.016	0.012	0.054	0.088	0.004	0.021
Fe^{2+}	0.005	0.211	0.003	---	0.013	0.009	0.006	0.005	0.179	0.001	---	---	0.001	0.012	0.016	---	0.011
Cu^{2+}	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Zn^{2+}	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Al	1.622	1.289	2.085	1.721	1.382	---	2.430	1.345	1.360	1.201	1.187	1.161	1.138	1.199	1.555	1.909	1.328
Sum Y	3.000	3.000	3.000	3.000	3.000	3.019	2.772	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Mg	---	---	---	---	---	0.119	---	---	---	---	---	---	---	---	---	---	---
Al	6.000	6.000	6.000	6.000	6.000	5.881	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
Sum Z	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
B	---	---	---	---	---	---	1.225	---	---	---	---	---	---	---	---	---	---
Al	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Si	5.915	5.918	5.800	6.010	6.126	5.873	4.871	5.938	5.868	5.978	6.021	5.989	6.027	5.969	5.977	5.883	5.955
Sum T	5.915	5.918	5.800	6.010	6.126	5.873	6.096	5.938	5.868	5.978	6.021	5.989	6.027	5.969	5.977	5.883	5.955
B	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
OH	3.508	3.501	3.263	3.792	3.522	3.899	3.304	3.653	3.299	3.265	3.207	3.265	3.115	3.258	3.363	3.488	3.200
F	0.492	0.499	0.737	0.208	0.478	0.101	0.053	0.347	0.701	0.735	0.793	0.735	0.885	0.742	0.637	0.512	0.800
Sum W	4.000	4.000	4.000	4.000	4.000	4.000	3.357	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000

TABLE 2. Continued

	AT48	AT49	AT50	AT51	AT52	AT53	AT54	AT55	AT56	AT57	AT58	AT59	AT60	AT61	AT62	AT63	AT64
Na	0.289	0.609	0.415	0.522	0.507	0.409	0.490	0.756	0.515	0.401	0.628	0.229	0.205	0.202	0.607	0.609	0.687
K	0.002	0.004	---	---	0.002	0.006	---	0.004	---	0.002	---	---	---	---	0.002	0.008	0.004
Ca	0.669	0.013	0.093	0.075	0.038	0.548	0.084	0.072	0.007	0.476	0.144	0.762	0.768	0.769	0.130	0.177	0.168
Vacancy	0.040	0.374	0.492	0.403	0.453	0.037	0.426	0.168	0.478	0.121	0.228	0.009	0.027	0.029	0.261	0.206	0.141
Sum X	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Li	1.480	1.065	0.892	0.926	1.250	0.162	1.299	0.113	1.211	0.083	0.160	0.056	0.112	0.050	1.336	0.236	0.842
Mg	0.033	0.021	---	0.002	---	2.648	---	2.681	---	2.815	2.535	2.879	2.789	2.774	---	2.446	0.153
Ti^{4+}	0.010	0.001	---	0.002	0.001	0.114	---	0.028	---	0.007	---	0.028	0.034	0.036	---	0.050	0.095
V^{3+}	---	---	---	---	---	---	---	---	---	0.073	---	0.024	0.059	0.122	---	0.031	0.003
Cr^{3+}	---	---	---	---	---	---	---	---	---	0.022	---	0.005	0.006	0.010	---	0.007	0.001
Mn^{2+}	0.075	0.061	0.016	0.013	0.004	---	0.017	---	0.016	---	---	---	---	---	0.275	0.003	0.090
Fe^{2+}	0.178	0.100	0.023	0.015	---	0.053	0.001	0.043	0.043	---	0.021	0.004	---	0.008	0.064	0.007	1.054
Cu^{2+}	---	---	---	---	---	---	---	---	---	---	---	0.004	---	---	---	---	---
Zn^{2+}	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.005	---	0.004
Al	1.224	1.752	2.068	2.042	1.745	---	1.683	0.135	1.730	---	0.284	---	---	---	1.320	0.220	0.758
Sum Y	3.000	3.000	3.000	3.000	3.000	2.977	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Mg	---	---	---	---	---	0.510	---	---	---	0.356	---	0.447	0.318	0.516	---	---	---
Al	6.000	6.000	6.000	6.000	6.000	5.490	6.000	6.000	6.000	5.644	6.000	5.553	5.682	5.484	6.000	6.000	6.000
Sum Z	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
B	---	---	0.447	0.792	---	---	---	---	---	---	---	---	---	---	---	---	---
Al	---	---	---	---	0.081	0.023	0.043	---	0.042	0.030	0.043	0.337	0.449	0.377	---	0.082	0.136
Si	5.901	5.917	5.553	5.208	5.919	5.977	5.957	6.000	5.958	5.970	5.957	5.663	5.551	5.623	6.038	5.918	5.864
Sum	5.901	5.917	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.038	6.000	6.000
B	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
OH	3.248	3.610	3.673	3.906	3.785	3.497	3.563	3.874	3.833	3.238	3.929	3.169	3.263	3.195	3.408	3.861	3.442
F	0.752	0.390	---	0.094	0.215	0.503	0.437	0.126	0.167	0.762	0.071	0.831	0.737	0.805	0.592	0.139	0.558
Sum W	4.000	4.000	4.000[h]	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000

TABLE 2. Continued

	AT65	AT66	AT67	AT68	AT70	AT71 NMR1	AT71 NMR7	AT71 NMR9	AT71 NMR10	AT72	AT73 SHM1	AT73 SHM2	AT73 SHM3	AT75 SHW1	AT75 SHW2	AT76
Na	0.522	0.209	0.228	0.202	0.210	0.265	0.315	0.438	0.494	0.846	0.603	0.587	0.639	0.547	0.531	0.663
K	---	0.000	0.001	---	---	0.002	---	0.002	0.002	0.004	---	---	---	---		---
Ca	0.067	0.721	0.770	0.774	---	0.654	0.614	0.497	0.436	0.109	0.057	0.060	0.056	0.199	0.272	0.017
Vacancy	0.411	0.070	0.001	0.024	0.790	0.079	0.071	0.063	0.068	0.041	0.340	0.353	0.305	0.254	0.197	0.320
Sum X	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Li	1.527	1.793	0.050	0.081	---	1.608	1.523	1.341	1.222	---	1.034	1.015	1.006	1.339	1.373	0.421
Mg	---	---	2.820	2.737	1.440	0.014	0.002	0.010	0.012	2.454	---	---	---		---	---
Ti^{4+}	---	0.005	0.030	0.035	---	0.002	0.001	0.001	0.001	0.050	---	0.006	0.038	0.024	0.002	0.022
V^{3+}	---	0.003	0.057	0.125	---	---	---	---	---	---	---	---	---	---	---	---
Cr^{3+}	---	0.002	0.036	0.022	---	---	---	---	---	---	---	---	---	---	---	---
Mn^{2+}	0.021	0.023	0.001	---	---	0.052	0.197	0.404	0.513	---	0.051	0.087	0.172	0.043	0.060	0.739
Fe^{2+}	---	0.016	0.003	---	0.130	0.049	0.020	0.036	0.033	0.021	0.001	0.004	0.307	0.032	0.005	0.003
Cu^{2+}	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Zn^{2+}	---	0.002	0.002	---	---	---	---	---	---	---	---	---	---	---	---	---
Al	1.454	1.156	---	---	1.420	1.275	1.257	1.208	1.219	0.475	1.914	1.888	1.477	1.565	1.562	1.815
Sum Y	3.002	3.000	3.000	3.000	2.990	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.003	3.002	3.000
Mg	---	---	0.484	0.400	---	---	---	---	---	0.486	---	---	---	---	---	---
Al	6.000	6.000	5.516	5.600	6.000	6.000	6.000	6.000	6.000	5.514	6.000	6.000	6.000	6.000	6.000	6.000
Sum Z	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
B	---	---	---	---	---	---	---	---	---	---	0.598	0.592	0.300	0.225	0.270	---
Al	---	0.027	0.389	0.488	---	---	---	---	---	---	---	---	---	---	---	---
Si	6.103	5.973	5.611	5.512	6.000	5.939	5.930	5.924	5.908	5.908	5.402	5.408	5.700	5.775	5.730	5.716
Sum T	6.103	6.000	6.000	6.000	6.000	5.939	5.930	5.924	5.908	5.908	6.000	6.000	6.000	6.000	6.000	5.716
B	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
OH	3.521	3.179	2.957	3.192	4.000	3.181	3.024	2.982	3.153	3.925	3.833	3.833	3.937	3.582	3.581	3.624
F	0.479	0.821	1.043	0.808	0.000	0.819	0.976	1.018	0.847	0.075	0.167	0.167	0.063	0.418	0.414	0.376
Sum W	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	3.995	4.000