

1. Analysis method of Ti concentration in quartz

Titanium concentrations in quartz were analyzed at the Wuhan Microbeam Analysis Technology Co., Ltd. with a JEOL JXA-8230 Electron Probe Microanalyzer equipped with five wavelength-dispersive spectrometers (WDS). The samples were firstly coated with a thin conductive carbon film prior to analysis. The precautions suggested by Zhang and Yang (2016) were used to minimize the difference of carbon film thickness between samples and obtain a ca. 20 nm approximately uniform coating. During the analysis, an accelerating voltage of 20 kV, a beam current of 500 nA, a 20 μm spot size, and a 200 s counting time were used. In order to reduce the detection limit and improve the measurement accuracy, the polycrystal test method proposed by Cui et al. (2021) and ZAF correction value were used to measure Al and Ti in quartz. The peak count of Ti was obtained with two PETL crystals, and the peak count of Al was obtained with TAPL and tap crystals. The X-ray background values of Al and Ti were fitted by the multipoint background method provided by Cui et al. (2019). During the experiment, a quartz reference standard was tested to monitor the accuracy of the results. The test results of this experiment are Al = 152.8 ppm ($n = 15$, S.D.= 2.13), Ti = 57.9 ppm ($n = 15$, S.D.= 1.99), which is consistent with the reference value (Al = 154 ± 15 ppm; Ti = 57 ± 4 ppm; Audétat et al., 2015). The following standards were used: Corundum (Al), Rutile (Ti).

2. Results

Host rock	Spot number	CH1+CH2 Ti(ppm)	S.D. (%)	TitaniQ thermometer after Huang et al., 2012
granite	QHS21-1-2-1	22.2	0.71	804
granite	QHS21-1-2-2	11.2	1.00	752
granite	QHS21-1-2-3	7.42	1.23	724
granite	QHS21-1-2-4	25.8	0.66	816
granite	QHS21-1-2-5	25.2	0.67	814
granite	QHS21-19-1	28.6	0.63	825
granite	QHS21-19-2	25.2	0.67	814
granite	QHS21-19-3	1.28	2.96	624
granite	QHS21-19-4	10.7	1.02	748
granite	QHS21-19-5	12.6	0.94	760
granite	QHS21-2-2-1	3.20	1.87	672
granite	QHS21-2-2-2	6.92	1.27	719
granite	QHS21-2-2-3	20.1	0.75	796
orbicule	QHS21-9-1	6.13	1.35	711
orbicule	QHS21-9-2	2.70	2.04	662
orbicule	QHS21-9-3	2.08	2.32	648
orbicule	QHS21-9-4	1.70	2.57	638
granite	QTM21-10-3-1	25.4	0.66	815
granite	QTM21-10-3-2	32.3	0.59	835
granite	QTM21-10-3-3	21.3	0.73	800
granite	QTM21-10-3-4	10.9	1.01	750
granite	QTM21-2-2-1	9.48	1.09	740
granite	QTM21-2-2-2	5.65	1.41	706
granite	QTM21-2-2-3	4.22	1.63	688
granite	QTM21-3-2-1	1.06	3.26	614
granite	QTM21-3-2-2	5.11	1.48	700
granite	QTM21-3-2-3	6.22	1.34	712
granite	QTM21-3-2-4	7.08	1.26	720
granite	QTM21-3-2-5	6.29	1.34	713
granite	QTM21-7-1	33.4	0.58	838
granite	QTM21-7-2	25.3	0.67	814
granite	QTM21-7-3	8.46	1.15	732
granite	QTM21-7-4	7.02	1.26	720
orbicule	QTM21-9-1-1	6.31	1.33	713
orbicule	QTM21-9-1-2	10.3	1.04	746
orbicule	QTM21-9-1-3	5.31	1.45	702
orbicule	QTM21-9-1-4	19.7	0.75	794

Note: aTiO₂ was set as unity during the calculation considering the occurrence of rutile.

References cited

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