

## Supplementary Material – Tables

**Table S1**

<b>Target Temperature</b>	<b>Pressure</b>	<b>Tcycling up</b>	<b>Tcycling down</b>	<b>t</b>	<b>Tot. Run Time</b>
<b>°C</b>	<b>Mpa</b>	<b>°C</b>	<b>°C</b>	<b>h</b>	<b>d</b>
775	200	TT +25	TT -5	4	28
725	200	TT +15	TT -15	4	30
675	200	TT +15	TT -15	4	31

Note: cycling was run for all the experiments for a total of 10 days.

1 complete cycle correspond to 4 h (2 hours at high temperature + 2 hours at low temperature).

The transition between the high temperature plateau (~ 2 hours) and the low temperature (~ 2 hours) plateau was achieved within ~5 minutes.

**Table S2:** mineral analyses of solid phases for 775 and 725 °C runs

	775 °C		775 °C		775 °C		775 °C		725 °C		725 °C	
	Plag	std	Amph	std	Bt	std	Mag	std	Plg	std	Mag	std
<b>n</b>	7		6		7		5		7		7	
<b>SiO<sub>2</sub></b>	56.56	0.79	45.12	1.64	36.74	0.41	0.31	0.08	59.15	0.83	0.82	0.35
<b>TiO<sub>2</sub></b>	0.04	0.02	1.97	0.23	4.05	0.18	6.81	0.83	0.09	0.04	2.36	0.05
<b>Al<sub>2</sub>O<sub>3</sub></b>	26.38	0.43	8.53	1.03	14.06	0.10	2.09	0.10	24.30	0.52	1.30	0.06
<b>FeO<sub>tot</sub></b>	0.52	0.19	13.43	0.85	13.68	0.38	78.21	0.77	1.25	0.20	85.81	0.77
<b>MnO</b>	0.02	0.01	0.42	0.10	0.15	0.06	0.64	0.06	0.03	0.04	0.91	0.06
<b>MgO</b>	0.04	0.03	13.20	0.47	13.50	0.46	1.08	0.07	0.07	0.04	1.07	0.04
<b>CaO</b>	9.47	0.34	11.49	1.39	0.04	0.02	0.10	0.02	7.17	0.39	0.12	0.02
<b>Na<sub>2</sub>O</b>	5.44	0.23	1.45	0.20	0.54	0.06	0.05	0.04	6.34	0.40	0.09	0.04
<b>K<sub>2</sub>O</b>	0.55	0.10	0.65	0.10	8.36	0.12	0.08	0.01	0.83	0.09	0.11	0.02
<b>Total</b>	99.02		96.26		91.11		89.34		99.22		92.58	

Plg, Amph, Bt and Mag refer to plagioclase, amphibole, biotite and magnetite, respectively. n = numbers of crystals analysed. std refers to 1 $\sigma$  standard deviation.

**Table S3:** Fet-Mg partition coefficient between melt and amphibole-biotite from this study and literature data .

Reference	composition	T (°C)	$K_{D, \text{Fe-Mg, amph-bt}}$
Dall'Agnol et al. (1999)	metaluminous to slightly peraluminous A-type granite	706	0.947
Costa et al. (2004)	Dacite (San Pedro)	850	1.039
		825	1.113
Holtz et al. (2005)	Dacite (Unzen)	775	1.028
Bogaerts et al. (2006)	Granodiorite (Lyngdal)	850	1.001
Marxer et al. (2019)	Tonalite (Adamello)	750	0.887
		725	1.212
		700	1.256
Marxer et al. (2022)	high-Mg basalt (Adamello)	870	1.205
		870	1.247
This study	Dacite (Fish Canyon)	775	1.004

**Table S4:** Glass analyses away from the trap and within the quartz trap at 775 and 725 °C for 9 and 3 hours experimental runs. Data are reported in Figure 5.

T	d	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	FeO	MnO	MgO	CaO	Na <sub>2</sub> O	K <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	Comment
775 °C	3 h	74.51	0.26	14.45	0.99	0.12	0.21	1.80	3.07	4.60	n.a.	glass-away from trap
		74.23	0.22	14.45	1.29	0.11	0.18	1.68	3.27	4.57	n.a.	glass-away from trap
		74.67	0.21	14.23	1.11	0.10	0.14	1.64	3.26	4.64	n.a.	glass-away from trap
		74.55	0.24	14.14	1.25	0.06	0.26	1.79	3.19	4.54	n.a.	glass-away from trap
		74.04	0.21	14.49	1.22	0.02	0.22	1.74	3.45	4.61	n.a.	glass-away from trap
	average	<b>74.40</b>	<b>0.23</b>	<b>14.35</b>	<b>1.17</b>	<b>0.08</b>	<b>0.20</b>	<b>1.73</b>	<b>3.25</b>	<b>4.59</b>		
775 °C	3 h	77.64	0.18	12.88	1.04	0.03	0.16	1.45	2.27	4.34	n.a.	glass-in trap
		75.67	0.20	13.62	1.06	0.09	0.16	1.58	3.20	4.42	n.a.	glass-in trap
		76.82	0.23	12.91	1.15	0.10	0.17	1.45	2.92	4.26	n.a.	glass-in trap
	average	<b>76.71</b>	<b>0.20</b>	<b>13.14</b>	<b>1.08</b>	<b>0.07</b>	<b>0.17</b>	<b>1.49</b>	<b>2.80</b>	<b>4.34</b>		
775 °C	9 h	74.07	0.18	14.66	1.08	0.03	0.22	1.46	3.49	4.81	n.a.	glass-away from trap
		75.15	0.22	14.04	0.91	0.03	0.17	1.40	3.24	4.84	n.a.	glass-away from trap
		74.09	0.23	14.25	1.31	0.07	0.17	1.45	3.56	4.87	n.a.	glass-away from trap
		74.46	0.25	14.21	1.20	0.06	0.17	1.58	3.37	4.70	n.a.	glass-away from trap
		74.68	0.22	14.23	1.15	0.07	0.18	1.38	3.38	4.73	n.a.	glass-away from trap
	average	<b>74.49</b>	<b>0.22</b>	<b>14.28</b>	<b>1.13</b>	<b>0.05</b>	<b>0.18</b>	<b>1.45</b>	<b>3.41</b>	<b>4.79</b>		
775 °C	9 h	77.49	0.21	12.54	0.77	0.01	0.15	0.98	3.07	4.78	n.a.	glass-in trap

		77.38	0.19	12.60	0.89	0.06	0.16	1.02	3.09	4.61	n.a.	glass-in trap
		77.43	0.22	12.40	1.01	0.04	0.11	1.17	3.05	4.57	n.a.	glass-in trap
		77.12	0.17	12.49	1.21	0.02	0.13	1.01	3.10	4.74	n.a.	glass-in trap
<b>average</b>		<b>77.35</b>	<b>0.20</b>	<b>12.51</b>	<b>0.97</b>	<b>0.03</b>	<b>0.14</b>	<b>1.05</b>	<b>3.08</b>	<b>4.67</b>	<b>n.a.</b>	
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725 °C	3 h	77.24	0.13	13.09	0.54	0.08	0.08	0.97	2.76	5.10	0.02	glass-away from trap
		77.22	0.15	13.32	0.58	0.10	0.21	1.01	2.51	4.88	0.02	glass-away from trap
		76.50	0.15	13.28	0.83	0.00	0.06	1.10	2.97	5.09	0.02	glass-away from trap
		76.81	0.11	13.12	0.59	0.08	0.05	1.36	2.79	5.08	0.02	glass-away from trap
<b>average</b>		<b>76.95</b>	<b>0.13</b>	<b>13.20</b>	<b>0.63</b>	<b>0.09</b>	<b>0.10</b>	<b>1.11</b>	<b>2.76</b>	<b>5.04</b>	<b>0.02</b>	
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725 °C	3 h	79.50	0.15	11.96	0.69	0.00	0.10	0.91	2.17	4.51	0.02	glass-in trap
		79.21	0.12	12.02	0.49	0.00	0.06	0.88	2.48	4.74	0.01	glass-in trap
		78.96	0.14	12.37	0.28	0.00	0.00	1.06	2.49	4.67	0.02	glass-in trap
		79.05	0.11	12.04	0.46	0.00	0.13	1.09	2.40	4.72	0.01	glass-in trap
		79.41	0.15	11.86	0.57	0.00	0.13	1.06	2.20	4.61	0.02	glass-in trap
<b>average</b>		<b>79.23</b>	<b>0.13</b>	<b>12.05</b>	<b>0.50</b>	<b>0.00</b>	<b>0.11</b>	<b>1.00</b>	<b>2.35</b>	<b>4.65</b>	<b>0.02</b>	
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725 °C	9 h	77.11	0.15	13.17	0.78	0.09	0.17	1.06	2.46	5.00	0.02	glass-away from trap
		76.75	0.13	13.22	0.73	0.15	0.13	1.02	2.81	5.05	0.01	glass-away from trap
		76.48	0.24	12.98	0.99	0.03	0.43	1.21	2.56	5.07	0.01	glass-away from trap
		77.60	0.13	12.82	0.57	0.04	0.17	1.09	2.61	4.92	0.03	glass-away from trap
<b>average</b>		<b>76.99</b>	<b>0.16</b>	<b>13.05</b>	<b>0.77</b>	<b>0.08</b>	<b>0.22</b>	<b>1.09</b>	<b>2.61</b>	<b>5.01</b>	<b>0.02</b>	
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725 °C	9 h	78.94	0.14	12.12	0.79	0.07	0.11	0.88	2.39	4.54	0.02	glass-in trap

	78.78	0.14	12.32	0.67	0.00	0.10	1.09	2.30	4.58	0.02	glass-in trap
	79.57	0.12	11.77	0.43	0.00	0.12	1.05	2.43	4.51	0.01	glass-in trap
	79.36	0.20	12.07	0.31	0.03	0.14	1.01	2.44	4.42	0.01	glass-in trap
<b>average</b>	<b>79.16</b>	<b>0.15</b>	<b>12.07</b>	<b>0.55</b>	<b>0.03</b>	<b>0.12</b>	<b>1.01</b>	<b>2.39</b>	<b>4.51</b>	<b>0.02</b>	

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**Table S5:** Partition coefficients

Element	K <sub>D</sub>			
	Plag	Bt	Ilm	Amph
Zr	0.003	0.14	1.39	0.5 <sup>1</sup>
Nb	0.003	9.75	91.2	2.5 <sup>2</sup>
Cs	0.0007	0.46	0.0005	0.01 <sup>1</sup>
Yb	0.02	0.03	1.5 <sup>4</sup>	3 <sup>3</sup>
U	0.008	0.01	0.04	0.01 <sup>6</sup>
Ce	3.57	0.005	0.01	3 <sup>5</sup>
Y	0.1 <sup>4</sup>	1.2 <sup>4</sup>	0.4 <sup>2</sup>	10 <sup>5</sup>

All values from Pichavant et al. (2024), if not indicated otherwise.

<sup>1</sup>Bacon and Druitt (1988)

<sup>2</sup>Ewart & Griffin (1994)

<sup>3</sup>Nagasawa and Schnetzler (1971)

<sup>4</sup>Nash and Crecraft (1985)

<sup>5</sup>Sisson (1994)

<sup>6</sup>KD of U for Amph was taken from Bt