

Contents



Kurzfassung	iii
Abstract	v
1. Introduction	1
1.1. Plagioclase Feldspar in Igneous Rocks	3
1.2. Trace Elements in Plagioclase	6
1.3. Background and Aim of the Study	9
2. Geological Setting of Santorini	11
2.1. The Aegean Sea and the Hellenic Arc	12
2.2. Santorini Volcanic Field	13
2.3. The Minoan Eruption	17
3. Petrography	23
3.1. Introduction	23
3.2. Sample Locations	24
3.3. Minoan Pumice Clasts	26
3.4. Minoan Scoria Clasts	43
4. Major, Minor and Trace Elements in Minoan Samples	65
4.1. Matrix Glass and Melt Inclusions	65
4.2. Phenocryst Analyses	72
5. Lithium Diffusion in Minoan Plagioclase	121
5.1. Introduction	121
5.2. Lithium Diffusion in Minoan Plagioclase	124
6. Partition Coefficients	145
6.1. Introduction	145
6.2. Partition Coefficients of Trace Elements in Minoan Plagioclase . . .	146
7. Discussion: Lithium Distribution in Minoan Plagioclase	153
7.1. The Lithium vs Anorthite Correlation Phenomenon	153

7.2. The Origin of Lithium Diffusion in Minoan Plagioclase	164
8. Conclusions	181
Bibliography	183
A. Methods	201
A.1. Sample Preparation	201
A.2. Scanning Electron Microscope – SEM	201
A.3. Electron Probe Microanalysis – EPMA	201
A.4. Secondary Ion Mass Spectrometry – SIMS	204
A.5. Numerical Modeling of Diffusion	206
A.6. Geothermometers	207
B. Sample Overview	211
B.1. SAN52 to SAN57 – Minoan A	211
B.2. SAN58 & SAN61 – Minoan B	233
B.3. SAN59 – Minoan C	254
B.4. SAN50 & SAN51 (Crystal-rich pumice) – Minoan D	268
B.5. SAN52Agg – SAN53 – SAN56 – SAN60 – Minoan Scoria	292
C. Danksagung	345
D. Eidesstattliche Erklärung	347