

TABLE 4.¹

Summary of experimental conditions

| Category A: Quartz present in the experimental charges | | | |
|--|---|---|---|
| Reference & Experiment type | Starting composition | <i>P</i> – <i>T</i> window, buffer | Remarks |
| PB <i>Melting & crystallization</i> n[†] = 14 | Synthetic quartz amphibolite , SQA (54 wt% hornbende, 24 wt% quartz, 20 wt% plagioclase and 2 wt% ilmenite. | 3 – 15 kbar 840 – 950 °C QFM | Amphibole, and especially plagioclase, in the melting experiments vary in composition, and do not always represent equilibrium near solidus compositions. Run products in crystallization experiments on the contrary closely correspond with equilibrium composition. Quartz is present in run products. |
| S <i>Subsolidus experiment</i> n[†] = 7 | Olivine tholeiite from Mid Atlantic Ridge | 1 – 5 kbar 650 – 883 °C HM, QFM & WM | All run products with HM buffer contain quartz. Therefore, available data on coexisting Hbl, Pl in run products only with HM buffer are adopted. Silica-saturation in the charges, T2-119A and T2-44A is not precisely mentioned. However, these two runs are adopted in the regression analysis because the corresponding experiments were carried out with HM buffer. |
| EL <i>Melting experiment</i> n[†] = 6 | MORB | 8 – 10 kbar 700 – 900 °C FMQ | All run products from the subsolidus region ($P \leq 1.2$ kbar and $T \leq 700$ °C) contain quartz. Only those run in which composition of one pair of coexisting Hbl and Pl are provided by the authors used in the numerical analysis. Runs with several Hbl and/or Pl analysis have not been used (e.g. run at 700 °C/12 kbar). |
| SD <i>Dehydration melting</i> n[†] = 2 | Amphibolite with 76.3 wt% ferroan pargasite, 20.5 wt% An ₅₅ plagioclase, 2.3 wt % quartz and 0.9 wt% titanite and <1% garnet. | 15 kbar 875 – 900 °C No buffer | Experimental runs B1, B2 and B3 contain Amph, Pl and Qtz. But run B2 has been discarded because Fe ³⁺ in amphibole for this run could not be recast using the formulation of Leake et al. 1997. |

TABLE 4.¹ (contd.)

| Reference & Experiment type | Starting composition | <i>P</i> – <i>T</i> window, buffer | Remarks |
|--|---|--|---|
| CNW <i>H₂O-saturated & Undersaturated melting</i> n[†] = 5 | 1) Metaluminous ‘I-type’ dacite 2) Peraluminous ‘S-type’ greywacke | 10 kbar 675 – 825 °C | Both starting materials contain quartz. All run products on dacite starting material are used in regression analysis. Amphiboles in greywacke are inhomogeneous. For example, in run 305B, calcic-amphibole mantles gedritic cores, while in the run 311B they co-exist as discrete phases. Further, amphibole analyses, for which co-existing plagioclase compositions are known, fall in the Fe-Mn-Ti group of Leake et al. (1997) and are essentially ferro-gedrite. Therefore, runs with greywacke bulk composition have not been used in this study. |
| P <i>Subsolidus experiment</i> n[†] = 3 | Silica-saturated (hy- normative) olivine basalt | 8 – 14 kbar 640 – 650 °C | The assemblage amphibole+plagioclase+quartz is stable upto 14 kbar at 650 °C temperature. Though amphibole analyses are provided for all runs, co-existing plagioclase compositions for three runs (RA8, RA5 and RA11) are available. So only these three runs have been chosen. |
| JR <i>Phase-equilibrium experiment</i> n[†] = 1 | Quartz latite from Fish Canyon Tuff, Colorado | 2 – 3.5 kbar 780 °C NNO, MNO & AMQH | Co-existing hornblende and plagioclase analyses are available for the runs 86 and 80 only. Quartz is present in run 80, but not obvious in 86. Therefore, only run 80 has been adopted. The co-existing melt compositions in both the runs lie close to quartz-sandine saturation. |
| H <i>Melting experiment</i> n[†] = 4 | Tholeiitic-basalt | 4.7 – 5.2 kbar 700 – 876 °C QFM & HM | Co-existing amphibole and plagioclase data are available for eight runs. Quartz is present in runs PG-subsolidus, PG-700, 1921-subsolidus and 1921 HM. Only these run products are considered. |

TABLE 4.¹ (contd.)Category B: Quartz absent but SiO₂ saturated melt

| Reference & Experiment type | Starting composition | <i>P</i> – <i>T</i> window, buffer | Remarks |
|--|--|--|---|
| CW <i>Crystallization-partial melting experiment (H₂O-undersaturated)</i> | 1) Tonalite from Sierra Nevada batholith | 15 kbar 850 °C NNO | Co-existing plagioclase and amphibole composition is available for only one run (# 64), which is a tonalite with 5 wt% H ₂ O (TW5) added. In the run product, quartz is lacking, but coexisting amphibole and plagioclase co-exist with a silica-saturated liquid (69.9 wt% SiO ₂). |
| | 2) A mixture of 95% tonalite and 5% natural peridotite and | | |
| | 3) Tonalite or tonalite-peridotite mixture with 5 wt% and 10 wt% H ₂ O added | | |
| BS <i>Crystallization experiment</i> | Mafic inclusion of andesitic composition (JM 102) | 1 kbar 960 °C NNO | Though quartz is not present, Hbl-Pl co-exists with a high-SiO ₂ glass. The glass in run #5-263 contains 62.83 wt% SiO ₂ . In the other run (5-264), SiO ₂ is 58.39 wt%. |
| RD <i>Crystallization experiment</i> | Dacite | 2.2 kbar ~ 920 °C NNO & MnO-Mn ₃ O ₄ | The starting material and the experimental run products lack quartz. However, glasses in the experiments coexisting with Hbl and Pl contain 68-73 wt% SiO ₂ . |
| RSCD <i>Crystallization experiment</i> | Dacite from Mount St. Helens | 1.8 – 2.3 kbar 875 – 916 °C QFM, G-CH & NNO | Quartz is absent in the starting material and in the run products. Hornblende and plagioclase in experimental runs co-exist with a glass of rhyo-dacite composition. Amphibole and plagioclase analyses are available for only three runs, 142A, 147A and 160B. The coexisting glass in these runs have 64%, 64.7% & 71.4% wt% SiO ₂ respectively. |

TABLE 4.¹ (contd.)

| Reference & Experiment type | Starting composition | <i>P</i> – <i>T</i> window, buffer | Remarks |
|---|---|---|---|
| RW <i>Dehydration melting experiment</i> | Natural amphibolites from: 1) metamorphosed Archean tholeiite 2) High-alumina basalt 3) Low-potassium tholeiite 4) Alkali-rich basalt | 8 kbar 1000 – 1075 °C QFM, HM & WM | Hbl-Pl analyses are provided for four runs (rock 1: 8kbar/1000 °C, 8kbar/1075 °C; rock 2: 8kbar/1000 °C; rock 3: 8kbar/ 1000 °C). Run products do not contain quartz. But the crystalline phases co-exist with melts in which SiO ₂ wt% are 71.14%, 58.21%, 63.43% and 75.06% respectively. |
| LC <i>Fluid absent melting experiment</i> | MORB derived amphibolite | 4 – 14 kbar 850 –950 °C | Quartz is not present either in the starting composition or in the run products. However, the supersolidus run products coexist with melt that contain ~65 wt% SiO ₂ . |

Note: PB, Patino-Douce and Beard (1995); S, Spear (1981b); EL, Ernst and Liu (1998); SD, Sen and Dunn (1994); CNW, Conrad et al. (1988); P, Poli (1993); JR, Johnson and Rutherford (1989); CW, Carroll and Wyllie (1989, 1990); BS, Blundy and Sparks (1992); RD, Rutherford and Devine (1988); RSCD, Rutherford et al. (1985); H, Heltz (1973, 1976); RW, Rapp and Watson (1995); and LC, Lopez and Castro (2001).

[†]n refers to the number of experimental run data chosen from the author.

¹MSA's deposit item 1.