

TABLE 1. Results of Runs on the Quartz-Coesite Transition at 1100°C

Starting Material*	Type of Pressure Cell	Run Procedure	Nominal Pressure, kb	Time, min	Results
Q	T	One-stage compression	35	60	Quartz + trace coesite (<<4%)
Q	T	One-stage compression	35.5	60	Quartz
Q	T	One-stage compression	36	60	Quartz + almost equal coesite
Q	T + BN ₂	One-stage compression	35	60	Quartz
Q	T + BN ₂	One-stage compression	35.5	60	Quartz
Q	T + BN ₂	One-stage compression	36	60	Coesite + 50% quartz
C	T + BN ₂	One-stage compression	35	60	Quartz
C	T + BN ₂	One-stage compression	36	60	Coesite + trace quartz
Q	AgCl + BN ₂	One-stage decompression	35	60	Coesite
Q	AgCl + BN ₂	One-stage decompression	33	60	Coesite
Q	AgCl + BN ₂	One stage decompression	31	60	Coesite + 60% quartz
Q	AgCl + BN ₂	One-stage decompression	30	60	Quartz
Q	T + BN ₂	Two-stage compression	35	60	Quartz
Q	T + BN ₂	Two-stage compression	36	60	Coesite + 60% quartz
Q	AgCl + BN ₂	Two stage compression	31	60	Quartz
Q	AgCl + BN ₂	Two-stage compression	32	60	Quartz
Q	AgCl + BN ₂	Two-stage compression	33	15	Coesite + 70% quartz
Q	AgCl + BN ₂	Two-stage compression	34	50	Coesite
Q	T + BN ₂	Two-stage decompression	30	60	Quartz
Q	T + BN ₂	Two-stage decompression	32	60	Quartz
Q	T + BN ₂	Two-stage decompression	33	60	Quartz + trace coesite (4%)
Q	T + BN ₂	Two-stage decompression	34	60	Coesite + 60% quartz
Q	AgCl + BN ₂	Two-stage decompression	30	60	Quartz
Q	AgCl + BN ₂	Two-stage decompression	31	60	Quartz + trace coesite (<4%)
Q	AgCl + BN ₂	Two-stage decompression	32	60	Coesite
C	AgCl + BN ₂	Two-stage decompression	30.5	60	Quartz + 10% coesite
C	AgCl + BN ₂	Two-stage decompression	31.5	55	Coesite

Q signifies mix composed of 94% quartz, 4% coesite, and 2% silicic acid.

C signifies mix composed of 90% coesite, 5% quartz, and 5% silicic acid.

re medium showed that the ent in the space normally specimen capsule is less than un, once thermal equilibrium temperature varies by approxi- per side of the control point. es are believed to have a an $\pm 10^\circ\text{C}$. Oil pressure ap- measured with a Heise gage of better than 0.1%. The on the sample (i.e., assuming on of applied pressure) is e measured oil pressure, using ectional areas of the piston

materials consisted of very s of either (1) 94% quartz, 2% silicic acid or (2) 90% z, and 5% silicic acid. The se mixes was prepared from ed to a temperature of 900 ssure of 40 kb for 2½ hours. used for most of the runs. A d to be in the quartz field had demonstrably disap- coesite field when the amount l measurably. A few runs on eonstrated reversibility of

10 to 20 mg of undried sam- platinum tube of wall thick- ree different ways of achiev- temperature conditions of a

compression. The pressure required value, then the tem- d to 1100°C. This method ward piston movement when figure 1a) and talc + boron ediums (Figure 1b). It was se it for the silver chloride + ure medium (Figure 1c), but, ture was increased, expansion sulted in a pressure excess of at in actual fact the run was pressure had to be released. ver chloride, the single-stage ressure and temperature re- sion run.

e compression. The pressure out 2 kb below the required erature was then raised to

1050°C, followed by final adjustment of pres- sure to the required value, and the procedure was completed with final adjustment of tem- perature to 1100°C.

3. Double-stage decompression. The pres- sure first applied was about 5 kb above the required value and then the temperature was increased to 1050°C. Release of pressure to the required value followed and finally the tempera- ture was increased to 1100°C.

In this way the quartz-coesite equilibrium was approached from the quartz stability field (two-stage compression) or from the coesite stability field (two-stage decompression). At the conclusion of a run the sample was quenched by switching off the power to the furnace. The sample was then examined by optical and X- ray means, and the relative amounts of quartz and coesite were estimated.

RESULTS

The conditions and results of the runs are summarized in Table 1 and Figure 2. There is no difference between the results obtained using talc or talc + boron nitride as the pressure medium. Also there is no significant difference between single-stage and two-stage compression runs.

The quartz-coesite transition at 1100°C oc- curs at a nominal pressure of 35.5 kb in a two- stage compression run with a talc + boron nitride pressure medium and at 33.0 kb in a two-stage decompression run with the same pressure medium. Thus the difference in the pressure of the quartz-coesite transition be- tween the two-stage compression and decom- pression runs is 2.5 kb. This is attributed to friction between the piston and the walls of