Thermochimica Acta, 7 (1973) 247–248

Note

Transition temperatures for (Sr, Ba)CO_3 : a possible DTA temperature standard

M. D. JUDD AND M. I. POPE

Department of Chemistry, Portsmouth Polytechnic, Portsmouth PO1 3QL (England)

(Received 10 May 1973)

We should like to contribute to the recent correspondence from Finch et al.[1] and from Smith et al.[2,3] on the use of $Na_2CO_3 \cdot CaCO_3$ as a DTA temperature standard.

Although not wishing to comment on the use of this particular material we feel that double carbonates can offer considerable scope in the field of temperature standards for DTA. In this connection we should like to point out the results we have obtained[4] on some double strontium–barium carbonates.

Strontium carbonate and barium carbonate both undergo crystal transitions from the orthorhombic to the hexagonal form at temperatures of 930°C and 810°C respectively. The crystal structure of the SrBa double carbonates has been studied by Cork and Gerhard[5] who showed that the metallic barium atoms in the carbonate lattice are replaceable by strontium atoms with a slight increase in lattice dimensions, or vice versa. We have shown that these double carbonates also undergo the orthorhombic–hexagonal transition at a temperature which is dependent on the composition of the double carbonate. The results are shown in Table 1.

TABLE 1

Mole % $BaCO_3$ in $(SrBa)CO_3$	*Transition temperature °C (±2°C)*
0	930
10	872
20	831
30	808
40	788
50	780
60	776
70	779
80	786
90	797
100	810

In each case, a single sharp endotherm was obtained on heating when the DTA experiment was carried out in an atmosphere of air or CO_2 (under vacuum decomposi-

tion commences at ca. 750°C); an exotherm at a somewhat lower temperature was obtained on cooling. Reheating the same sample led to the endotherm reproducing with the temperature agreeing to ±2°C.

We would therefore suggest that these materials may prove useful as standards for DTA over the temperature range 780–930°C.

1 M. Finch, R. M. McIntosh and F. W. Wilburn, *Thermochim. Acta*, 5 (1973) 365.
2 J. W. Smith, D. R. Johnson and W. A. Robb, *Thermochim. Acta*, 5 (1973) 366.
3 J. W. Smith, D. R. Johnson and W. A. Robb, *Thermochim. Acta*, 2 (1971) 305.
4 M. D. Judd and M. I. Pope, *J. Appl. Chem. Biotechnol.*, 21 (1971) 285.
5 J. M. Cork and S. L. Gerhard, *Amer. Miner.*, 16 (1931) 71.