of relationship is that the two polymorphic crystal structures may be related by a simple deformation. An elastic constant or a combination of them will be a measure of the mechanical resistance of the crystal to this deformation and the ratio of this elastic constant to the bulk modulus provides a suitable scaled measure of this mechanical resistance to deformation, and is also related to the free energy difference between the two phases, because this elastic constant is the second derivative of the free energy along a path connecting the two crystal structures.

Demarest *et al.*[27] showed that the idea of a modified Born criterion to predict phase transitions was consistent with a large body of data on phase transformations in various crystal structures. The data on KF and RbF appeared to be anomalous, however, because the transition pressures reported by Vaidya and Kennedy implied that $\alpha = 0.26$ and 0.28 for these two compounds, while for the other alkali–halides it ranged from 0.14 to 0.22. The revised values we get using the transition pressures reported in this paper are $\alpha = 0.19$ and 0.13 for KF and RbF, respectively.

The new data on the phase transitions in KF and RbF combined with the other data on transitions in alkali halides shows that the simple theories discussed here are in moderately good agreement with the data. This tends to confirm that this type of simple theory can be useful in predicting high pressure phase transitions in other systems which have not been so thoroughly studied by experiments.

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REFERENCES

1. Vaidya S. N. and Kennedy G. C., *J. Phys. Chem. Solids* **32**, 951 (1971).
2. Darnell A. J. and McCollum W. A., *J. Phys. Chem. Solids* **31**, 805 (1970).
3. Weir C. E. and Piermarini G. J., *J. Res. NBS* **68A**, 105 (1964).
4. Morris C. E. and Jamieson J. C., Unpublished work.
5. Roberts R. W. and Smith C. S., *J. Phys. Chem. Solids* **31**, 619 (1970).
6. Roberts R. W. and Smith C. S., *J. Phys. Chem. Solids* **31**, 2397 (1970).
7. Yagi T., *J. Phys. Chem. Solids* **39**, 563 (1978).
8. Halleck P. M. and Olinger B., *Rev. Sci. Instrum.* **45**, 1408 (1974).
9. Piermarini G. J., Block S. and Barnett J. D., *J. Appl. Phys.* **44**, 5377 (1973).
10. Wicks C. E. and Block F. E., *U.S. Bureau of Mines Bulletin* 605 (1963).
11. Carter W. J., *High Temperatures–High Pressures* **5**, 313 (1973).
12. Spieglan M. and Jamieson J. C., *High Temperatures–High Pressures* **6**, 479 (1974).
13. Fritz J. N. Marsh S. P. Carter W. J. and McQueen R. G., *Natl. Bur. Std.* (U.S.) Special Publication No. 326 (1971).
14. Meyer S. L., *Data Analysis for Scientists and Engineers.* Wiley, New York (1975).
15. Decker D. L., *J. Appl. Phys.* **42**, 3239 (1971).
16. Powell D. R. and MacDonald J. R., *The Computor J.* **15**, 148 (1972).
17. Jamieson J. C., in *High Pressure Research, Applications in Geophysics* (Edited by M. H. Manghnani and S. Akimoto). Academic Press, New York (1977).
18. Swanson H. E. and Tatge E., *Natl. Bur. Std.* (U.S.), Circ. 539, Vol. I (1953).
19. Swanson H. E., McMurdie H. F., Morris M. C. and Evans E. H., *Natl. Bur. Std.* (U.S.), Mono. 25, Section 8 (1970).
20. Shannon R. D., *Acta Cryst.* **A32**, 751 (1976).
21. Pauling L., *The Nature of the Chemical Bond*, 3rd Edn. p. 522. Cornell University Press, Ithaca (1960); Pauling L., *Z. Krist.* **67**, 377 (1928); Pauling L., *Z. Krist.* **29**, 35 (1928).
22. Bassett W. A. and Takahashi T., in *Advances in High Pressure Research* (Edited by R. H. Wentorf), Vol. 4, p. 165. Academic Press, New York (1974).
23. Jamieson J. C. Halleck P. W. Roof R. B. and Pistorius C. W. F. T., *J. Phys. Chem. Solids* **36**, 939 (1975).
24. Schulz L. G., *Acta Cryst.* **4**, 487 (1951).
25. National Bureau of Standards (U.S.) Circular 539, II, III, IV (1953–5).
26. Demarest H. H., *J. Geophys. Res.* **77**, 848 (1972).
27. Demarest H. H., Ota R. and Anderson O. L., in *High Pressure Research, Applications in Geophysics* (Edited by M. H. Manghnani and S. Akimoto). Academic Press, New York (1977).