

found that low or α -spodumene could be synthesised easily by crystallising the glass at temperatures above 750° and pressures in excess of 20 kb, if a pressure of 10 kb or more was maintained during the heating-up period. Fig. 8 shows plots of the percentage of α - and β -eucryptite crystallising out as a function of time under these conditions.

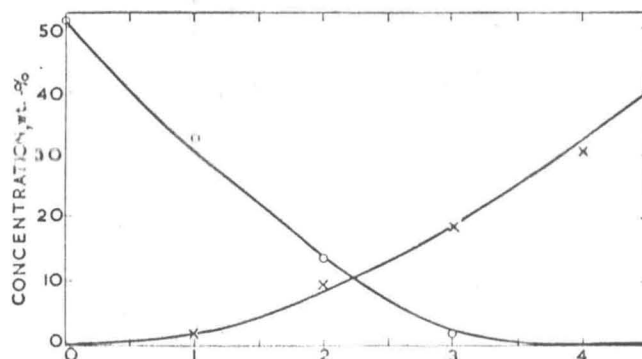


Fig. 8. Crystallisation of α (x) and β -eucryptite (o) out of glass in a constant time period as function of the pressure applied during heating up

The temperature and pressure of crystallisation are kept constant at 650° and 20 kb. Points along abscissa indicate pressure during heating 0, none; 1, 5; 2, 10; 3, 15; 4, 20 kb.

Clearly the nuclei of the high-density phases are formed at the lower temperature under pressure. However, these nuclei will *not* grow at appreciable rates below 400°, and, if the sample is heated at temperatures between 400 and 600°, the nuclei of the β -phase will form and grow faster. If the pre-formed nuclei are taken to a high enough temperature, then the growth of these α -phase nuclei predominates over the nucleation and growth of the β -phases.

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References

- ¹ Bridgman, P. W., & Simon, I., *J. appl. Phys.*, 1953, 24, 405
- ² (a) Dacheille, F., & Roy, R., *Z. Krist.*, 1959, 111, 451; (b) *idem.*, 'High-pressure Phenomena', 1960, pp. 441-46, in 'McGraw-Hill Encyclopedia of Science and Technology' (New York: McGraw-Hill Book Co. Inc.); (c) *idem.*, *Amer. J. Sci.*, 1960, 258, 225
- ³ Dacheille, F., & Roy, R., 'Opposed-Anvil Pressure Devices', in 'Modern Very High Pressure Techniques', (R. H. Wentorf, jun., ed.), 1962 (Washington: Butterworths Publications)
- ⁴ Dacheille, F., & Roy, R., this Symposium, p. 77
- ⁵ Birch, F., Schairer, J. F., & Spicer, H. C. (eds.), 'Handbook of Physical Constants', *Geol. Soc. Amer., Spec. Pap.*, 1942, No. 36, p. 51
- ⁶ Schmitz-DuMont, Gossling, H., & Brokopf, H., *Z. anorg. Chem.*, 1959, 300, 159
- ⁷ Blinov, V., & Roy, R., 'Catalysis of Glass Crystallisation under Extreme Pressure', *Amer. Ceram. Soc. Mtg.*, May, 1962
- ⁸ Roy, R., *Miner. petrogr. Mitt.*, 1959, III, 185
- ⁹ Ruiz-Menacho, C., & Roy, R., *Bull. Amer. ceram. Soc.*, 1959, 38, 229 (Abstr. only)