obviously be sought in the large displacements which take place during the transition of the shock wave from a medium with a given dynamic rigidity to another and which stimulate the process of phase transformation.

The crystalline structure of some samples was also analyzed with an electron microscope of the type UEMV-100, equipped with an electronograph. The results of these investigations are in full agreement with the x-ray measurements.

The interpretation of the diffractograms could be made on the basis of an orthorhombic lattice, which is more or less close to the one described in [8] where a new crystalline modification of TiO_2 was synthesized in static conditions; the orthorhombic lattice of this modification belongs to the space group Pbcn, while the elementary cell contains in itself four molecules of TiO_2. The new phase of silica has the following parameters: a = 4.30, b = 4.70, c = 4.50 Å. The values of the interplanar distances are d_{cal}, calculated from these parameters, satisfactorily coincide (see Table 1) with the observed values d_{obs}.

In the above-mentioned work, there is no detailed calculation of the intensities of the new-phase lines of SiO_2, but a comparative evaluation of the relative value of the diffraction maxima of the diffractograms and the relative intensities of the new phase of TiO_2 reveals a satisfactory agreement between the two. The crystal density, calculated from the lattice parameters, is equal to 4.435 gm/cm³. We may note here that, due to the fairly strong broadening of the diffraction maxima and also due to the absence of diffraction maxima with large values of hkl, the accuracy of determination of the lattice parameters, did not exceed 0.01Å.

In conclusion, we must remark that the complex shock-wave process of sample loading and the subsequent removal of pressures from it, naturally, does not justify the assertion that the formation of the orthorhombic modification of silica takes place at the top of application of shock pressures to the SiO_2 sample. As was already observed, especially in [15], one cannot rule out the possibility that the orthorhombic phase is a consequence of the transformation of silica from an unknown high-density phase (possibly from a fluorite type of structure), which forms after repeated compressions and which seems to be unstable in normal conditions.

Received
May 13, 1974

REFERENCES

1. Handbook of Physical Constants Relating to Rocks (edited by S. Clark). (Russ. ed.), "Mir" Press. Moscow, 1969.

2. Coes, L. Jr. A New Dense Crystalline Silica. Science. 118, 131-132. 1953.

3. Stishov, S. M and S. V. Popova. A New Dense Modification of Silica. Geochemistry, No. 10, 837, 1961.

4. Wackerly, J. Shock-Wave Compression of Quartz. J. Appl. Phys., 33, No. 3, 922, 1962.

5. Dremin, A. N. and O. N. Breusov. Processes Occurring in Solid Bodies Under the Action of Intense Shock Waves. Progress in Chemistry, 37, No. 5, 899, 1968.

6. DeCarli, P. S. and D. G. Milton. Stishovite: Synthesis by Shock-Wave. Science, 147, 3654, 144. 1965.

7. German. V. N., M. A. Podurets and R. F. Trunin. Synthesis of a High-Density Phase of Silica in Shock Waves. Jour. Exp. and Theor. Physics, 64, No. 1, 205, 1973.

8. Bendeliani, N. A., S. V. Popova and L. F. Vereshchagin. Synthesis of a New Modification of Titanium Dioxide, Stable in High Pressures. Geochemistry, 5, 499, 1966.

9. Dulin, I. N., L. V. Al'tshuler, V. Ya. Vashchenko and V. N. Zubarev. Phase Transformations of Boron Nitride in Dynamic Compression. Physics of Solids. 11, No. 5. 1252, 1969.

10. Al'tshuler, L. V., K. K. Krupnikov, B. N. Ledenev, V. I. Zhuchikhin and M. I. Brazhnik. Dynamic Compressibility and the Equation of State for Iron at High Pressures. Jour. Exp. and Theor. Physics, 34, No. 4, 874, 1958.

11. McQueen, R. G. and S. P. Marsh. Equation of State for Nineteen Elements from Shock-Wave Measurements up to Two Megabars. J. Appl. Phys., 31, 7, 1253, 1960.

12. Krupnikov, K. K., M. I. Brazhnik and V. P. Krupnikova. Shock Compression of Porous Tungsten. Jour. Exp. and Theor. Physics. 42, No. 3. 675, 1962.

13. Bancroft, D., E. L. Peterson and S. Minshal. Polymorphism of Iron at High Pressure. J. Appl. Phys., 27, 3, 291, 1956.

14. Trunin, R. F., G. V. Simakov, M. A. Podurets, B. N. Moiseyev and L. V. Popov. Dynamic Compressibility of Quartz and Quartzite at High Pressure. Bull. (Izv.). Acad. Sci. USSR. Earth Physics, No. 1, 13, 1971.

15. Vereshchagin, L. F., S. S. Kabalkina and A. A. Kotilevets. Phase Transition in MnF_2 at High Pressure. Journ Exp. and Theor. Physics, 49, No. 6, 1728, 1965.