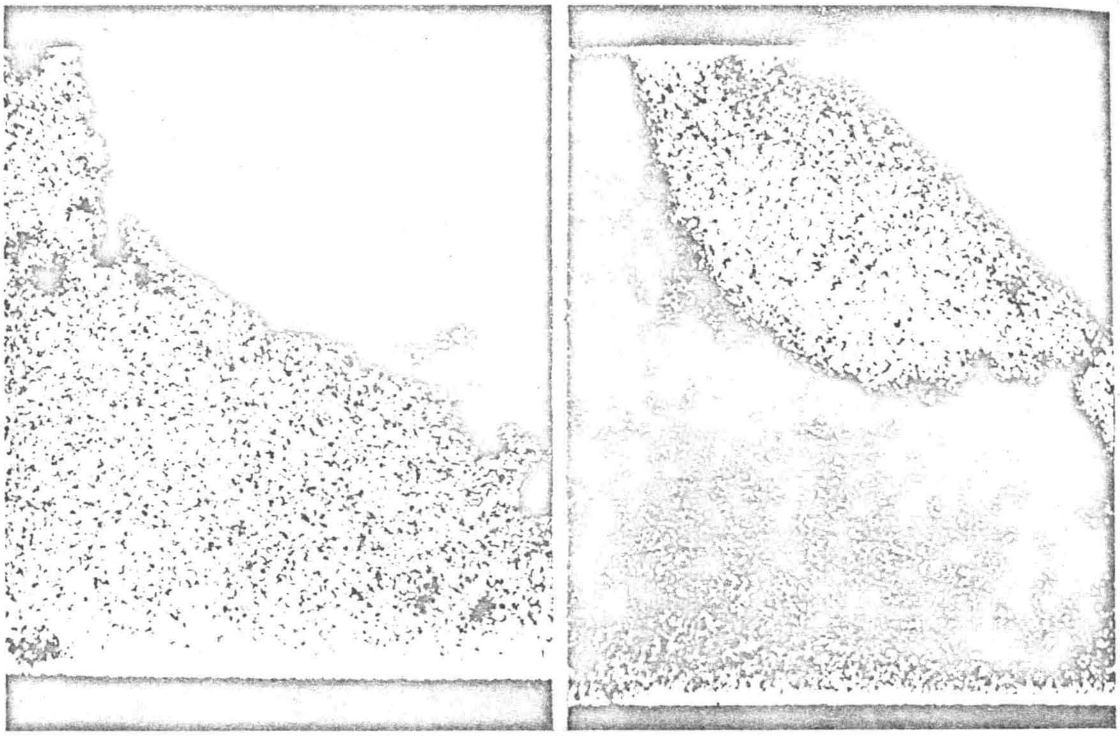

Fig. 2. Photograph of part (100 x 100 μ) of the central zone in X-radiation (SiK_{α} on the left, ZrL_{α}, on the right).

largely to that of the monoclinic modification of ZrO_2. For test No. 1 representing the maximum charge (150 g hexogen) there are lines of another rhombic modification of zircon stable at high pressures [19]. The lines of crystalline SiO_2 phases are missing. In zone one there are round, bluish-white or glass-clear inclusions, the amount of which varies appreciably with the charge weight. At a maximum charge these bluish inclusions occur in small quantities, solely near the contact zones one and two. When the charge is increased (80 and 100 g hexogen) this phase becomes more plentiful, occurring throughout zone one; in this case the X-ray pattern (Table 1, test No. 2; Fig. 1) exhibits lines representing zircon of reduced density. The refractive index of this phase is very variable even within the same inclusion and ranges, on the whole, from 1.785 to 1.830. This phase, however, cannot be glass, for it remains markedly birefringent. Such low refractive indices are known for the most metamict zircon. Axial zone one was studied by Yu. G. Lavrent'yev on a MS-46 X-ray microanalyzer. The central zone, including the bluish material, is not different in composition (within the limits of measurement precision) from the original zircon. Only the glass-clear round inclusions present in very small quantities near the edge of the axial zone are of pure SiO_2 (Fig. 2). Comparing the results of X-ray diffraction analysis, it can be assumed that the axial zone still consists mainly of a mixture of ZrO_2 and SiO_2, although the particle size of these phases is less than 1 to 2 μ, the area of the electron beam in the microanalyzer. Only a little of the SiO_2 was secreted as larger inclusions up to 100 μ in size. The bluish inclusions are relics of dissociated almost radioamorphous zircon. On the whole, zone one is a zirconoid representing the final product of metamict decay of zircon — a finely divided mixture of ZrO_2, SiO_2 and the remains of radioamorphous $ZrSiO_4$ [12, 15]. The three ampoule zones are thus equivalent in a first approximation to different stages in the metamict decay of zircon culminating in the axial ampoule zone.

The degree of decay in the axial zone, in particular the amount of bluish inclusions of radioamorphous zircon, is a function of the charge weight. Like metamict zircon [15], after being calcined for 10 hr at 1200°, all zones (one, two, two to three, three) totally regained the zircon structure and their X-ray patterns became identical (Table 1). However, there are differences from the metamict decay of natural zircon. The chief difference is that there is a sharp transition between zones one and two (especially in the case of maximum charges) from a partly disintegrated lattice to total dissociation into oxides.

Another difference is that among the dissociation products of metamict zircon different authors mention all three modifications of ZrO_2 — pseudocubic, tetragonal and monoclinic [12-15]; whereas we have only the monoclinic.

It follows from experimental data on the

system SiO_2-ZrO_2 ... above 1676°, zirc... SiO_2, after which ... formed almost in... the separation ou... the tetragonal m... above 1170° and ... temperatures. T... the formation of ... grated) zircon, ... fication of ZrO_2, ... instead of glass ... are inconsistent ... or melting of Zr... over, in static c... requires very p... peratures of 160...

1. Wackerle, ... 1962.
2. Adadurov, ... Zhurn. p... 1962.
3. Deribas, ... Dokl. Ak...
4. Ahrens, T... Geophys...
5. Milton, D... 140, No...

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[1]Translat... Doklady Ak... pp. 1176-11...