3.3. *Other framework silicates*

A similar situation in shock experiments with other framework silicates was observed. Some effects were determined for albite ($NaAlSi_3O_8$) similar to those for $KAlSi_3O_8$. A small quantity of jadeite was also found in shocked albite. The paper (MILTON and DE CARLI, 1963) contains a description of the transformation of anorthite $CaAl_2Si_2O_8$ into an X-ray-amorphous phase, with preservation of the shape of grains and even cleavage, similar to mascelenite in stone meteorites.

4. Discussion

It is possible to distinguish two types of phase-transformation in silicates (table 2). Type I "without axial zone" corresponds to framework silicates and SiO_2, type II "with axial zone" is characteristic of orthosilicates and some oxides. Type II may be divided into two subtypes: IIa "with decomposition", IIb "without decomposition". Naturally, this division is connected essentially with the conditions of shock compression, but in framework silicates and SiO_2 the axial zone has never been observed.

An intermediate picture was found in some other silicates. For instance, $MgSiO_3$ decomposed into Mg_2SiO_4 and X-ray-amorphous SiO_2, and the formation of glass $MgSiO_3$ with variable density was observed in the axial zone. In ferro-magnesian micas after shock compression, magnesian micas with the destroyed lattice, magnetite, native Fe and glass near to potassic felspatic composition were found.

Some transformation in shocked oxides are shown in tables 2 and 3. These transformations correspond to the high-temperature modifications (α-Al_2O_3), and to the high-pressure phases (Zr_2O_2, PbO). No transformations were found in some oxides (TiO_2) (BATSANOV *et al.*, 1967). However, a defect structure with change of colour was observed in this case. This type of transformation may be singled out as type III, and the relaxation and disappearance of X-ray lines were usually found in these experiments.

Broadening of Laue reflections in shocked single crystals of several materials was found in some experiments. It shows that the single crystals transform into a fine grained powder at a definite shock pressure.

The similarity between the shocked and "metamict"

TABLE 2

Transformations of silicate and oxide powders under shock wave treatment in the cylindrical case

Type	Characteristic features	Examples		
		Initial minerals	New phases*	
I	1. Indistinct or absent axial zone, i.e. unstable three-shock configuration	SiO_2 (quartz, glass)	Destroyed "quartz", s.r.o. phase of high density, traces of stishovite, rarely of coesite	
	2. Formation of glass-like phases of variable density (without fusion)	Framework minerals: $KAlSi_3O_8$ (orthoclase) $NaAlSi_3O_8$ (albite) $CaAl_2Si_2O_8$ (anortite)	Destroyed "orthoclase", s.r.o. phase of high density, traces of high pressure phase ?) s.r.o. phase, jadeite+SiO_2 s.r.o. phase (maskelinite)	
IIa	1. Distinct axial zone, corresponding to Mach's three shock configuration	Silicates: $ZrSiO_4$ (zircone)	Destroyed (metamictic) zircone, SiO_2+ZrO_2 (monoclin.), glass.	
	2. No glass-like phases, with partial or complete lattice deformation	$MgSiO_3$ (enstatite) $K(M,Fe)_3AlSi_3O_{10}(OH)_2$	SiO_2 (s.r.o.)+Mg_2SiO_4, glass Destroyed Mg-mica+$FeFe_2O_4$ or $Fe+SiO_2$+glass	
IIb	a. with decomposition to constituents b. with polymorphic transformations	Non-complex silicates and oxides: Mg_2SiO_4 (forsterite) Al_2O_3 (α and γ)	Fine-grade fracturing and partial deformation of the lattice	Traces of new phase high pressure (?) α-Al_2O_3
III	No phase transformations; partial lattice deformation	TiO_2		No new phases

* Destroyed – phase with partially or completely destroyed lattice; s.r.o. – short-range order (glass-like) phase.