

Structural Changes in Two Different Types of Oxide Glass Melts: Borates and Metaphosphates

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Z. Naturforsch. **53a**, 874–882 (1998); received February 17, 1997

X-ray diffraction experiments of molten oxide glasses, which give new insights into the structure of melts, were carried out. Using modern means (synchrotron radiation, image plates, container-less high-temperature technique) it could be shown that the short range order of melt and solid glass is often qualitatively different. If vitreous B_2O_3 or binary borate glasses with low content of network modifier are heated up above T_g , the network topology begins to alter. With rising temperature more and more of the boroxol groups are replaced by independent BO_3 groups. While melting a metaphosphate glass, however, structural changes of another kind take place. In solid glass the environment of the network modifier ions is similar to the one found in crystalline modifications, and their distances to the surrounding PO_4 tetrahedra have narrow distributions. In the melt, however, these distances scarcely become evident, probably owing to the increased thermal motion of the modifier ions.

Key words: X-ray Diffraction; Short Range Order; Borate Glasses; Phosphate Glasses; Glass Transition.

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