STATE AND ROLE OF Pb^{2+} IN LOW AND HIGH LEAD-CONTAINING GLASSES

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In the present work, we have examined in details the local environment of Pb2+ in various glasses mainly based on the X-ray and neutron diffraction analyses. As a result, it has been found that Pb2+ in low lead-containing glasses (< 50 mol% PbO) takes higher coordination state than 6-fold and works as a network modifier. On the other hand, Pb2+ in high lead-containing glasses (> 50 mol % PbO) forms PbO3 trigonal pyramids that are connected with each other by sharing corner oxygens to form clusters. In order to become glassy, such PbO3 clusters have to be connected firmly to each other via BO4 and SiO4 tetrahedra.