Physical properties of new Sb2O3-V2O5-K2O glasses


Authors: Y. Taibi, M. Poulain, R. Lebullenger, L. Atoui, M. Legouera.

Abstract

New heavy metal oxide glasses have been prepared and the compositional limits have been investigated in the Sb2O3-V2O5-K2O ternary system. Chemical composition of glass samples was checked by EDS analysis. The influence of the V2O5/Sb2O3 substitution on the physical properties of the (70-x) Sb2O3-V2O5-K2O glasses has been studied in the 0 < x < 40 range. Density decreases linearly from 4.3 g cm-3 to 3.4 g cm-3 as V2O5 replaces Sb2O3. However, the evolution of the physical properties such as glass transition temperature, elastic modulus, thermal expansion and microhardness is not monotonous. Tg increases for 0<x<5, but it decreases for x>5 with a minimum value between 25% and 35% V2O5. This unusual behavior suggests changes in the coordination number of the vanadium cations in relation to the network topology.

Keywords: Vanadate glass, Glass transition, Density, Elastic moduli, Thermal exposition, Microhardness.