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Experimental study of fO_2influence on oxidation and structural state of iron in pantelleritic melt.

M. Volovetsky (1), V. Rusakov (2), O. Lukanin (1), A. Kargaltsev (1)

(1) Vernadsky Institute of Geochemistry and Analytical Chemistry, Moscow, Russia, (2) Faculty of Physics, Lomonosov Moscow State University, Russia (volovetsky@gmail.com / Tel: (495)1374472 / Fax: (495)9382054)

Room temperature ^{57}Fe Mössbauer spectroscopy has been used to investigate the structural and oxidation state of Fe in pantelleritic glasses. These glasses are characterized by high contents of SiO_2 ($\sim$70 wt.%) and FeO_{tot} ($\sim$8 wt.%). Samples were produced in set of melting experiments at 1120 to 1340 ºC and oxygen fugacities of $10^{-0.68}$ (air) to 10^{-13} (IW buffer) bars. Samples were melted in vertical muffle tube under controlled oxygen fugacity and then quenched in water. Alumina crucibles were used as a container for powdered rock samples.

Mössbauer samples were prepared by grinding glasses under acetone or ethanol to avoid some oxidation prior to analysis, then mounting them in plexiglas holders. Mössbauer spectra have a characteristic form of asymmetrical broad doublets and were processed by means of calculation of hyperfine parameters distribution function.

Spectra analysis has shown that at the given temperature $Fe^{3+}/(Fe^{2+}+Fe^{3+})$ ratio in the melt considerably decreases with fO_2 decreasing. For example, at T=1220 ºC the ratio equals 0.90, 0.45, 0.25 and 0.10 at fO_2 equal $10^{-0.68}$, $10^{-2.8}$, $10^{-6.5}$ and $10^{-11.2}$ bars respectively. Increase of ferric iron content with temperature has been found in samples melted under oxygen fugacity about $10^{-2.8}$ bar whereas there was no significant temperature influence on ferric iron content under more oxidizing (air) and more reducing (below NNO buffer) atmosphere.

Mössbauer line shifts of ferrous ions in all glasses point out the distribution of ions into five-coordinated and octahedral positions. Ferric ions coordination changes from

octahedral to tetrahedral with increasing of its content starting from 60 at.% Fe.