STRUCTURE OF HYDROUS GLASSES $NaAlSi_3O_8$-$Na_2Si_2O_5$ JOIN: RAMAN STUDIES

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Keywords: *glass, water, spectroscopy*

Investigation of mechanism of solubility of water in experimental glasses is important for understanding of structure and dynamics natural melts and glasses. Structures of glasses of $NaAlSi_3O_8$-$Na_2Si_2O_5$-H_2O join were study by Raman and NIR spectroscopy. Anhydrous glasses were synthesized by direct melting of mixed powders of alkali carbonate, Al_2O_3 and SiO_2 at 1350-1500 ºC. Syntheses of hydrous glasses were performed in vertical autoclave at temperature 700 C and pressure 1000 bar. Samples were quenched using water at the initial cooling rate ~ 10ºC/s.

Analysis of NIR date indicate that behavior of water in water-bearing glasses of the $NaAlSi_3O_8$-Na_2SiO_3 join, basalt, rhyolite and albite glasses are similar [1-14]. It is shown that total concentration of water increase with decreasing of content Al_2O_3. The molecular water is dominant hydrogen-bearing species.

Table.

Contents of water species

Sample	Concentration of total water, wt. %	Concentration of molecular water, wt. %	Concentration of hydroxyl groups, wt. %
50Ds50Ab	10,6	8,6	2,0
70Ds30Ab	12,2	10,3	1,9
90Ds10Ab	13,2	12,2	1,0
100Ds0Ab	19,9	19,2	0,7

The strong bands are observed in low frequency and high frequency regions of Raman spectra of all samples. Analysis of Raman date indicated that degree of polymerization of anhydrous glasses decrease at decreasing of content of Al_2O_3. This process is due to shift the equilibrium of disproportion reaction and change intertetrahedral angles in alumosilicate anions. The structure anhydrous and hydrous glasses are different. Process of solubility of water with structure of glasses is reaction of exchange between the charge balancing metal cation and proton.

This study was supported by RFBR №01-05-96426.

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Electronic Scientific Information Journal "Herald of the Department of Earth Sciences RAS" № 1(21)'2003
Informational Bulletin of the Annual Seminar of Experimental Mineralogy, Petrology and Geochemistry – 2003
URL: http://www.scgis.ru/russian/cp1251/h_dgggms/1-2003/informbul-1_2003/magm-27e.pdf
Published on July 15, 2003