Modern natural and technogenic iodine biogeochemical provinces: Spatial structure and health effects

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The ubiquity of living matter proved its chemical coevolution with and adaptation to the Earth geochemical environment. However the existence of homeostatic concentration intervals providing normal functioning of biosystems has led to formation of endemic species and/or distribution of regional and local biogeochemical endemic diseases in cases of expansion of species to environments with concentrations outside thresholds or catastrophic releases of chemical elements and/or compounds. A failure of regulatory mechanisms in at least 20% of population may be a criterion for biogeochemical province with endemy [1].

The main goal of our study was to reveal and analyze the structures of natural and technogenic geofields of iodine in soil and food chain components and iodine-dependent medical effects.

The study of Bryansk oblast affected by the Cherbobyl fallout included: 1) estimation of the initial radioiodine contamination; 2) cartographic estimation of the soil iodine status; 3) determination of iodine in drinking water, milk, pasture plants, arable soil in private farms of 100 rural settlements provided with medical data on renal iodine excretion, endemic goiter and thyroid cancer.

Analysis of the obtained data organized as GIS data base allowed performing spatially adequate comparison of the geochemical and medical data and contouring of potential risk zones as a superposition of geofields of iodine.

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[1] Kovalsky (1983) Geochemical environment & life. Nauka, M. 77 p. [2] Korobova, Zvonova & Doroshchenko (2010) *RFBR report*, #07-10-00912, 34 p.

Raman spectroscopy of sodium silicates and germanates

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The approach to melt description we use here bases on idea of structural units make the basis of crystal chemistry of silicates and, when connected with one another via bridging bonds, form composite anions in melts or a disordered network in glass. The germanate system is of interest because of their analogy to silicates at high-pressure conditions. The local structure of silicate system can be presented as a set of silicon-oxygen tetrahedrons with various proportions of bridging and non-bridging oxigen atoms (Q^n-units, where n is the number of bridging oxygen atoms). The coordination number of germanium atoms in glasses has attracted much attention deu to a network forming cation can be in 4-coordinated and 6-coordinated states.

The concentrations of structural units Q^n can be determined experimentally by techniques of Raman spectroscopy, which has no principal limitations in terms of temperature, so that *in situ* structural studies can be carried on in melts. Sodium silicates and germanates of x%Na_2O·(100-x)%MO_2 composition, where M - Si or Ge, x = 33, 40, 50, 55 и 60 were synthesized from sodium carbonate and SiO_2 (GeO_2). To study the quantity dependence of structural units presented in glass (melt) from modifier content and temperature spectra were deconvoluted on Gaussian components.

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