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# Iodine in natural waters within geochemically different areas contaminated after the Chernobyl accident

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## Abstract

Iodine is an essential trace element required for synthesis of thyroid hormones and normal functioning of the whole organism. The presence of radioactive isotopes of iodine in the environment in conditions of natural deficiency may significantly increase the risk of specific diseases of the thyroid gland. The bioavailability of both stable and radioactive iodine and the specificity of its uptake by living organisms largely depends on geochemical parameters of the environment related to natural conditions of water migration. The main goal of this study was to investigate the features of distribution and speciation of I in natural water within the Bryansk region in connection with the identification of the role of drinking water in the occurrence of endemic goitre among the local population inhabiting areas of fluvioglacial and loess-like sedimentary rocks. The average content of iodide ion in the surface and ground water samples (n=123) did not exceed 11  $\mu\text{g/l}$ , the most enriched there were surface water with H-Ca, Ca and H-Ca-Fe classes of water migration (6,46-10,2  $\mu\text{g/l}$ ). Thermodynamic modeling (n=50) using data of chemical analysis confirmed domination of iodide (up to 97%) in the collected samples and the possibility of its existence in complexes with Ca (CaI<sup>+</sup>, CaI<sub>2</sub>, etc.). Formation of mineral and organo-mineral complexes can contribute to the removal of trace element from aqueous solutions. In addition, the capacity of iodide sorption by mineral phase (goethite) was evaluated and showed its possibility in equilibrium conditions. The obtained data is believed to be useful in explanation of mobility and uptake of iodine and its radioactive analogues with local drinking waters depending upon the particular geochemical conditions in the water-rock system.

**Keywords:** Iodine, water migration, natural water

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