## BROMINE DISTRIBUTION IN HUMAN ORGANISMS

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Bromine is an element that is poorly studied in biological aspects. There is information about its presence in all the living organisms, but that on concentration of this element in any particular organ – concentrator is not available [1]. In general, the highest content of Br is observed in the thyroid gland, but in some cases, high accumulations can be stated in blood and gastric mucosa. The main source of bromine is its intake with nutrition, mainly sodium chloride. Besides, significant amount of this element can come from the products grown with fumigants [3]. Anthropogenic activity can also influence the bromine concentration in the nature, thus coming to human organisms. Therefore, it was established that the petrochemical industry and, probably, the plants of nuclear fuel cycle are the potential sources of bromine emissions [4]. Despite the research shortage in characterization of biological role of bromine, the fact of its toxicity was confirmed by numerous works by both Russian and foreign authors [2], [5], [6], [7]. In addition, high bromine intake into the body can lead to bromine poisoning that can cause coma and, in the worst case, even death [1]. Thus, these facts prove the necessity of studying this element. The main goal of our work is to identify the level of bromine accumulation in various organs of human body by the example of Tomsk region.

Samples of organs (heart, liver, brain, spleen, etc.) were selected in two villages: Kaftanchikovo and Loskutovo. All the samples were prepared and then analysed by the instrumental neutron activation analysis in nuclear geochemical laboratory of the Geoecology and Geochemistry Department (Tomsk Polytechnic University). Bromine distribution is shown in Figures 1 and 2.

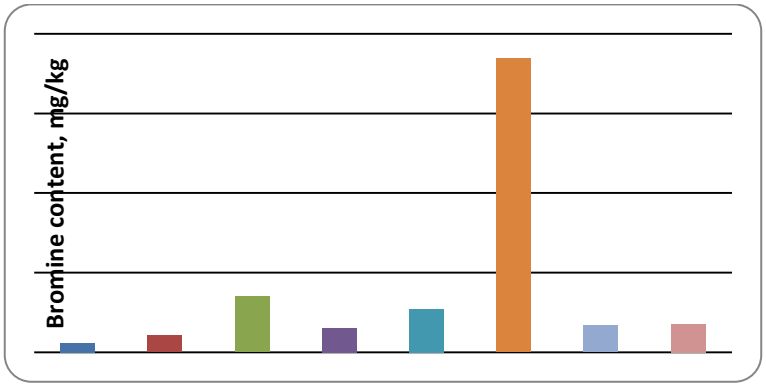


***Fig. 1. Bromine content (mg / kg) in various organs of the human body in Kaftanchikovo, where: 1 - brain, 2 - thyroid gland, 3 - heart, 4 - liver, 5 - lungs, 6 - aorta, 7 – spleen, 8 – muscles***

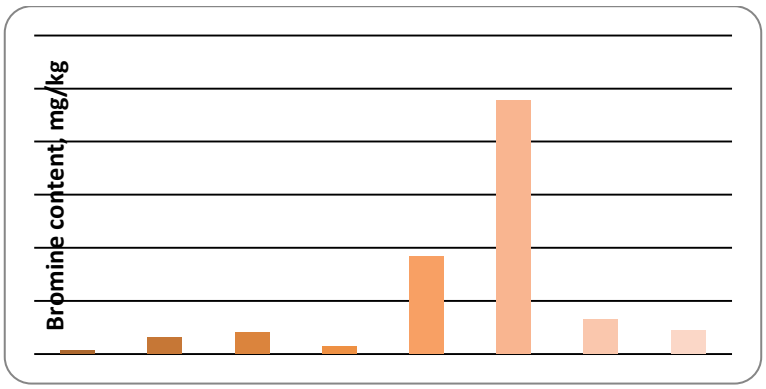


***Fig. 2. Bromine content (mg / kg) in various organs of the human body in Loskutovo, where: 1 - brain, 2 - thyroid gland, 3 - heart, 4 - liver, 5 - lungs, 6 - aorta, 7 – spleen, 8 – muscles***

According to the results obtained, the highest amount of bromine was detected in aorta, but in heart and lungs high concentrations are also observed. The lowest content was found in the brain and liver of Loskutovo village.

Besides, we compared our results with the literature sources describing the bromine content in the bodies of healthy people who are not subjected to external negative impact (Table).

*Table*

***Comparative characteristic of obtained results with literature sources***

| ORGAN | OBTAINED RESULTS, MG/KG | | LITERATURE DATA, MG/KG | AUTHOR |
|---|---|---|---|---|
| | *KAFTANCHIKOVO* | *LOSKUTOVO* | | |
| **BRAIN** | **11,5** | **3,7** | **3** | **ROSLYAKOV** |
| **THYROID GLAND** | **21,4** | **15,4** | **7,7 ± 0,3** | **VOYNAR** |
| **HEART** | **69,9** | **20,3** | **10** | **ROSLYAKOV** |
| **LIVER** | **30,8** | **7,3** | **10** | **ROSLYAKOV** |
| **LUNGS** | **54,3** | **91,7** | **30** | **ROSLYAKOV** |
| **AORTA** | **369** | **239,1** | **20-25** | **BERNGARDT AND UKKO** |
| **SPLEEN** | **33,8** | **33** | **9-15** | **BERNGARDT AND UKKO** |
| **MUSCLES** | **35,2** | **22** | **7,7** | **EMSLEY** |

As compared with the literature data, the increased bromine content is observed in the brain, liver of Kaftanchikovo and in the thyroid gland, heart, lungs, spleen and muscle of the two studied areas. The bromine content in the aorta is of particular interest, which is almost 15 times higher in Kaftanchikovo village and 10 times higher in the Loskutovo village. Elevated concentrations indicate the bromine intake from external sources. More detailed studies are necessary to analyze the specificity of bromine in these areas and to identify possible sources of impact.

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## THE INFLUENCE OF SUCCINIMIDE ADDITIVES ON HIGH-OIL COMPOSITIONS

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Oil recovery, development and transportation of hydrocarbons contained high content of paraffin and asphaltene compositions, which cause an increase in viscosity of oil disperse systems, as well as the loss of fluidity at low ambient temperatures. Therefore, necessary forecast data behavior of petroleum systems is needed in the transfer and transport process for various climatic conditions.

One of the methods to reduce the temperature of solidification and improve the rheological characteristics of the oil is the application of depressant additives that inhibit nucleation paraffin oil components and reduce the amount of oil residue. However, an important research task is to study the effect of additives on asphaltene components, which also form the oil deposits and complicate the oil recovery and transportation.

The following methods occur: viscosity measurement on mini rotary viscometer, temperature solidification measurement by the devices CRYSTAL developed at the Institute of Petroleum Chemistry, and the use of photon correlation spectroscopy to study the aggregation of asphaltenes.