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# Investigationof the coal-similar wood by the methods of IR- and EPR-spectroscopy

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## Abstract

By the IR- and EPR-pectroscopy methods it is carried out the study of organic matter of the coal-similar wood, which relates to the Devonian (CSW-1) and the Jurassic (CSW-2) geological periods. Element composition of the sample CSW-1, %: C – 74.4, H – 4.2, O – 20.2, N – 1.2; composition of the sample CSW-2, %: C – 54.4, H – 4.3, O – 39.7, N – 0.5. In the IR-spectra of the coal-similar wood samples the absorption bands with the maximums with 820-830, 860-870, ~1285, 1350-1370, 1445-1450, ~1610, 1650-1660, 2920-2940, 3380-3440 $sm^{-1}$ present, which testify about the structural units of aromatic nature. The comparative analysis of the spectra of investigated samples, activated carbon, and also the moss *Polytrichum* lignin, the birch wood lignin and the fir tree wood lignin made it possible to make a conclusion about the similarity of organic matter of the coal-similar wood and contemporary lignins. It is established that the investigated samples possess the clearly expressed paramagnetic properties. EPR-signals are isotropic singlets with the g-factor, which corresponds to phenoxyl radicals (2.003-2.004), being present in the native lignins. The parameters of carbonic radicals correspond to the degree of the metamorphic transformations (carbonate formation) of initial organic matter, wich is low for the sample CSW-2 and high of the sample CSW-1. The concentration of the free radicals $C_{pmc}$ in the Devonian coal-similar wood sampleis close to the limiting value for the carbonaceous substances. The presence of mineral phases is revealed by the EPR-spectroscopy method in the investigated samples. In the spectrum of CSW-2 sample the line in the region g = 4.3, caused by the high-spin state of the $Fe^{3+}$ ions, is fixed. For the sample CSW-1 it are established the lines with g = 2.29 and 2.89, which can be related to ions $Fe^{3+}$ in the low-spin state. Intensive partial spectrum with the complex hyperfine structure, characteristic for vanadyl ions $VO^{2+}$ is revealed for the sample CSW-2. As a result conducted investigations it is made conclusion about the proximity of organic matter of the coal-similar wood of Devonian and Jurassic geological periods to lignin's type polymers.

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