MS15-P5 **X-ray structure investigation of the minerals from lake-marsh ores.** Anton Chuev, Nikolai Fedorchuk, Maria Petrova. *Cherepovets State University, Russia*
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The subject of present investigation were chemical & phase-mineral composition, structural condition of ferrous and manganese-ferrous ores from lakes and boggy areas. Samples of such ores were supplied by museums of regional studies from Cherepovets and Ustyuzhna. The samples were extracted from riverbeds of Suda, Chagodostcha, Mologa, old Totyma rivers. For the further investigation, three of eight samples have been selected: a ferrous ore from the bed deposits of the Chagodostcha river, manganese ores from the old Totyma river and the Mologa river respectively. To purify the original probes from contaminant minerals, direct flotation with kerosene as an agent was used. Electron probe microanalysis (EPMA) of the individual samples Chagodostcha and Totyma was carried out with the raster electron microscope LEO 1455. The X-ray diffraction study of phase and mineral composition of the samples was carried out with the diffractometer Ultima IV Rigaku and the DRON-class computerized diffractometer.

Results and discussion. During the X-ray diffraction study of the sample Chagodostcha, on the diffraction pattern, the following minerals were identified: goethite (α-FeO(OH)), α-quartz, feldpath. The concentration of the last ones in the purified probe was minimal. The goethite structure was refined: a=0.46089, b=0.99436, c=0.30150 nm, Ort sys, Pbnm SG. The results of EPMA shows that in the probe Fe and O contents (at. %) in the probe correspond to the FeO(OH) composition. The aluminum contained in the Chagodostcha sample can be either the structure impurity in the goethite, or the residues of the after-flotation components of feldpath and Al_2O_3. Silicon is a component of the residual α-quartz and feldpath. The goethite microstructure state in the probes, according to our X-ray diffraction studies, is nano-crystalline. The size of crystallites of goethite in the probe is within 7 to 26 nm. Manganese ore in the purified probe is, most probably, represented by the minerals from birnessite group in several modifications. The á-quartz and Ab-An feldpath impurity reflexes were identified in the samples in the minimal quantities. In the Totyma and Mologa probes the presence of birnessite was identified on reflexes: 0.720, 0.361, 0.245 and 0.142 nm. The complex form of the reflex d~0.720 nm obtained in Cu-K_α radiation shows probable presence of several modifications of birnessite in the Mologa probe.

We can see that manganese concentration in different local point of the sample is characterized by wide variability (15-60 at. %). The significant value of the variability is observed for the following elements: Fe (1-12 at. %), Al (1-3 at. %), Si (1.5-17 at. %), Ca (1-3.25 at. %). This fact also shows the poly-element and poly-mineral composition of the studied manganese lake-marsh ores and of birnessite in particular. Fluorine is detected fragmentally and can present the group of anions $(OH)^-$, F^-, Cl^- in the probe. The microstructure state of the manganese mineral of the Totyma and Mologa samples, according to our X-ray diffraction studies, is nano-crystalline. The crystallite size in the probe is within 4 to 15 nm.

Main conclusions

1. The phase and mineral composition of the ferrous ores is goethite. The microstructure of the goethite is nano-crystals.
2. The manganese ores are presented by birnessite in several modifications. The microstructure of the birnessite is nano-crystals.

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