EXPERIMENTAL STUDY OF THE SOLUBILITI FOR THE COPPER SLAGS IN DISTILLIED WATER

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Pollution produced by metallurgical wastes dictates the necessity to study the mobilization chemical components out of it into the soil and hydrosphere. Some experimental researches of toxic components migration for different kinds of wastes were carried out last years [1, 2]. Some experiments on Mg - Fe slag interactions with alkaline solutions are done by Pryimak T.I. and. Zosin A.P. [3]. The experimental modeling of Ni-Co tails erosion is carried out by Gaskova O.L. [4].

When copper slags are used as untraditional source of copper the large amount of slag tails is produced. We carried out our experiments on mobilization of components out of the copper slag tails in a water solution. The sample of slag tails from Sredneuralski Copper Smelter was used.

The main mineral of this slag are (after Ryabinin V.F. Gulyaeva T.Y. [5]): fayalite, magnetite, hematite, diopside, quartz, iron and copper sulphides.

The experiment was carried out 33 days at room temperatures and atmospheric pressure, in open plastic glasses. The parameters of experiment (t = 25 C, P = 1 атм. $V_{H2O} > > V_{Slag}$) met to climatic conditions of a wood zone. Periodic replacement of the defended solution on distilled water was used for the imitation of soil system.

Sample of slag 50 g weight was placed in plastic glasses, filled in 200 ml of distilled water and carefully mixed. One day later pH of filtrate was measured. Chemical composition of filtrate was measured and it is shown in tab. 1.

Table 1. Contents of slag tails components in filtrate, mg/l.

Days	1	10	20	30	Days	1	10	20	30
Component	Content				Component	Content			
K	1.72	0.312	0.395	0.262	Ba	0.141	0.191	0.16	0.14
Mg	5.699	0.652	0.584	0.462	Si	1.87	2.57	3.7	1.74
Na	5.554	0.557	0.73	0.367	Al	0.164	0.202	0.283	0.084
Ca	261.921	5.234	5.00	4.924	Fe	0.045	2.036	3.328	1.006
Sr	0.16	0.0181	0.013	0.0101	Ti	0,0003	0,0037	0,0044	0,0012
Mn	0.299	0.0391	0.068	0.0491	(HCO3)-	30.5	30.5	30.5	24.4
Zn	0.929	1.034	1.335	0.714	(NO3)-	-	0.96	0.8	1.08
Cu	0.039	0.156	0.236	0.064	Cl-	-	2.76	15.2	2.55
Pb	0,05	0,023	0,067	0,04	F-	-	0.45	0.18	0.22
					(SO4)2-	625.8	1.38	н. о.	2.2

We found pH to be more o less stable (around 6.0) all the time of the experiment. Concentration of Ba was stable all the time of experiment.Quantity of some other measured chemical parameters in filtrate showed some dynamic in these 33 days.

Alkaline elements look to be more actively taken out of slag before the tenth day of experiment. The most solubility is shown by Ca (up to 261.921 mg/l) in the first day, Mg and Na showed up to 5.699 and 5.554 mg/l. The content of K in the first day was a bit less: 1.72 mg/l. Manganese content in solution in 33 days of experiment shows similar dynamic with alkaline elements. In conditions of our experiments alkaline elements did not show any dependence of its contents in solution with amount of Cl and F in filtrate. But some positive correlation of their quantity with the content of SO_4^{2-} was found.

The amounts of Fe, Ti, and Cu and in filtrate reached maximum to the twentieth day, then it began decrease. We see some positive correlation between amounts of Si, Al, Fe, and Ti and Cl. Titanium displayed positive correlation with F^- in solution. There is no any correlation between content of Al and Si but for the Fe and Ti amounts the negative correlation with SO_4^{2-} content is observed.

The amount of Cu, Zn and Pb grows accordingly with increase of Cl concentration. Content of Cu and Zn ignore changes in F^- amount whereas Pb displays negative correlation.

Content of SO_4^{2-} in solution was the largest in the first day and dynamic of Cu, Zn and Pb amount in solution did not show any correlation with SO_4^{2-}.

Summary

Copper slag tails are possible to be a source of some chemical components into water solution: Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Na, S, Si, Sr, Zn, Cl^-, F^-, $(SO_4)_2^-$. The main amount of dissolving material comes into solution in at least two stages. The first stage longs one ore a bit more days and the main portion of alkaline elements with $(SO_4)_2^-$ (and possibly F^-) went into solution. After it the content of these components in solution decreases. The second stage begun after the main part of alkaline elements and SO_4^{2-} (and possibly F^-) went. It longs since the tenth day till at least twenty days. The highest concentrations F-, Cl-, Si, Fe, Al, Zn, and Cu are noticed in that stage in filtrate. Before the 30'Th day dissolving of slag tails comes into the stable regime losing little amounts of all the chemical components.

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