INVESTIGATION OF THE LEACHING OF COPPER AND ZINC IN SULFURIC ACID FROM THE WASTE OF THE COPPER ENRICHMENT FACTORY.

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ABSTRACT: This article presents a brief overview of the methods for processing slags from copper smelting production and methods for processing waste from CCP-2.
In the Republic, scientific research in the field of copper production is aimed at developing technology for processing man-made formations in the form of waste metallurgical slags, dust and technological metal-containing solutions.

Key words: Copper, waste, concentrate, flotation, slag, coke, solution, cake, sulfuric acid, leaching, charge.

Introduction. The magnetic fraction and the non-magnetic fraction became the dressing when we enriched the soot, which was the result of the restorative burning, with the help of a magnetic separator. Iron shavings were extracted from the magnetic fraction. The non-magnetic fraction contains Cu, Au, Ag and other metals. Chemically expensive metals are sequentially isolated from the non-magnetic fraction. In the composition of the non-magnetic fraction, copper is found mainly in the form of Cu, Cu_2O and CuO. Sulfuric acid is a good solvent for oxidized minerals (MeO) and non-ferrous metal hydroxides. It is characterized by low cost of sulfuric acid and relatively low ability to absorb hydrometallurgical apparatus, in addition, sulfuric acid is produced from exhaust gases at JSC "Almalyk AMMC".

Research methods and results. 1) Preparation of slides: A Struers Labopol-5 semi-automatic machine for preparing metallographic samples with Laboforce equipment was used for preparing the slides. The rotation speed of the grinding wheel is adjustable and 0-500 rpm.

Sulfate electrolytic acid, for example, oxidation of the eruvchannik thermodynamics for example, the composition of the substance forming the erythroporin erythin core, temperature and concentrated erythrocyte, still serves as the basis. Bundan metalarning long-lasting erishin is armed with a rough set of descriptions according to the accounts of Olga Holda erythalardic acid sulfate Cu, Zn, Ni and Bosca yohlidash metalar research is considered important.

In the presence of sulfuric acid, the following reactions occur:

$CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$

$Cu_2O + H_2SO_4 = Cu_2SO_4 + H_2O,$
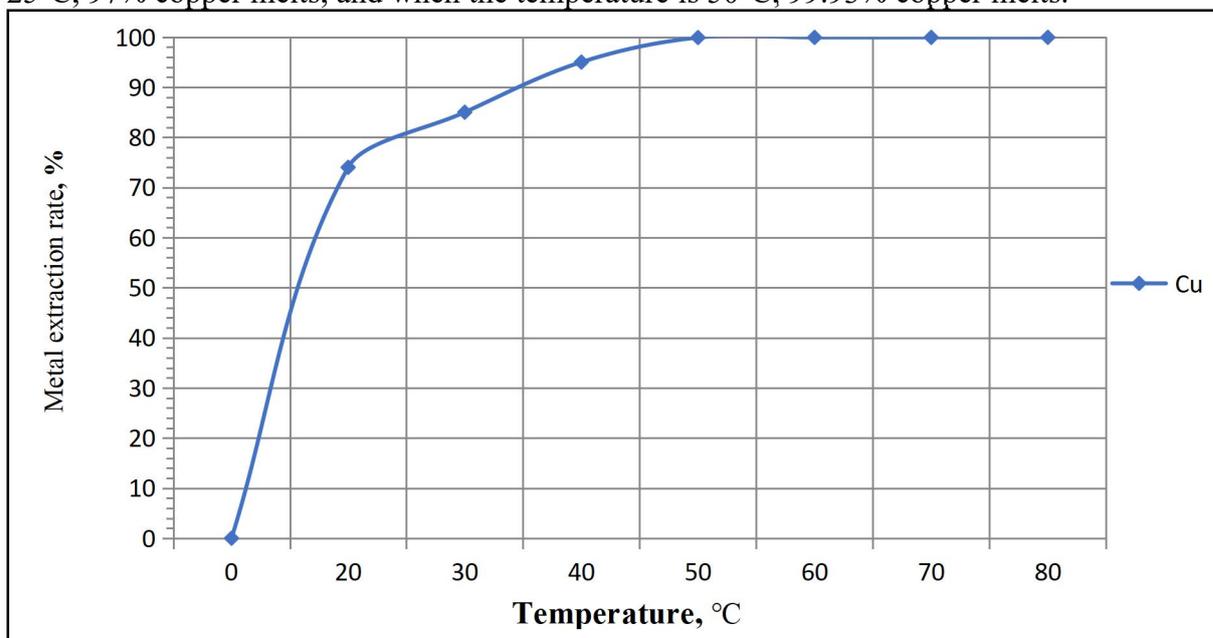
$ZnO + H_2SO_4 = ZnSO_4 + H_2O.$
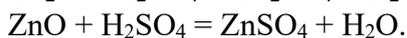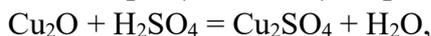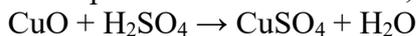
The degree of selective dissolution of copper in a non-magnetic fraction will depend on the concentration of sulfuric
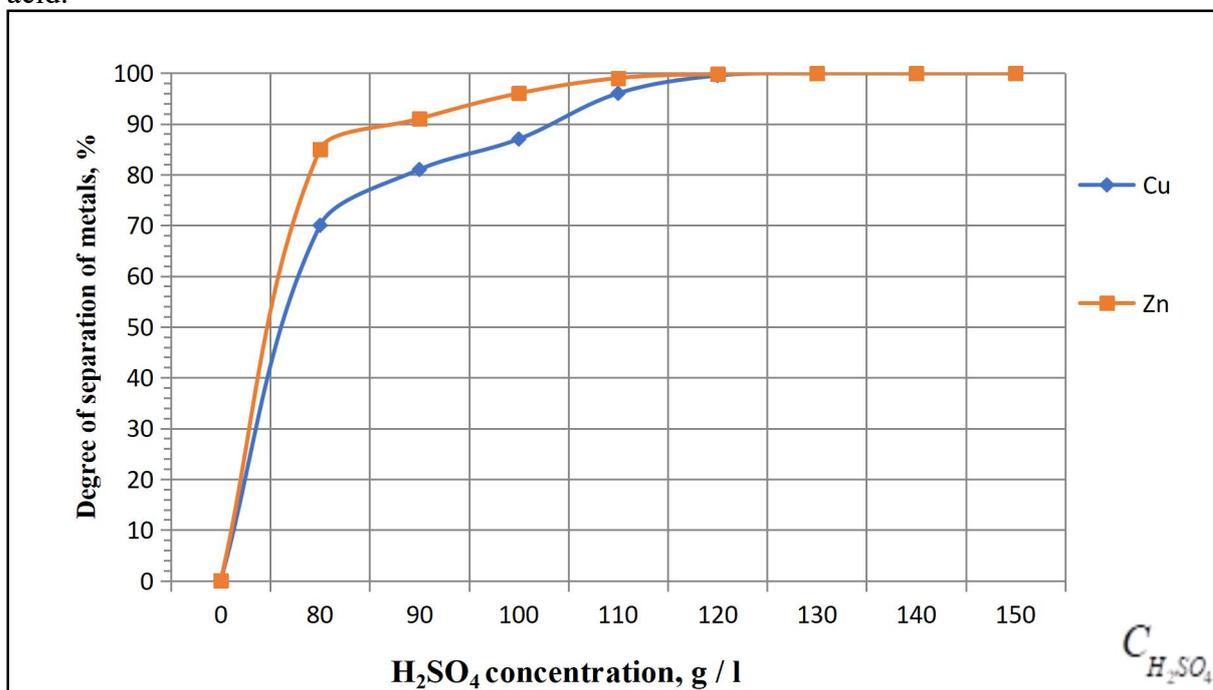
acid.

Figure 1. Dependence of the degree of separation of metals on acid concentration (experimental conditions: t=50℃, S:q=4:1, mixing speed   150 - circle/min).

From the results of the experiments, it can be seen that the optimal concentration of sulfuric acid is 125 - 130 g/l. When the temperature rises, there is a significant increase in the extraction of copper from the solution. The selective smelting duration is 0.5 hours, when the temperature is 25℃, 97% copper melts, and when the temperature is 50℃, 99.93% copper melts.

Figure 2. Temperature dependence of the degree of separation of metals into the solution (experimental conditions:-125-130 g/L, t-0.5 hours, S:Q=4:1, mixing speed 150 circles/min)

In selective smelting of the non-magnetic fraction (Q:S=1:4), the degree of copper extraction depends on the concentration of sulfuric acid and the duration of the process at a temperature of 50℃

The presented results of the experiments show that during the selective dissolution of the product with a solution of sulfuric acid, the transfer of copper to the solution reaches 99.6% at the end of the reaction, and then decreases proportionally to the duration of the process.

Table 1

The composition of the obtained solution after selectively dissolving the non-magnetic fraction with sulfuric acid (duration-30 min, temperature-50℃)

H_2SO_4 concentration, g/l	Solution composition, g/l	
	Cu	Zn
80	47,6	0,198
90	55,1	0,205
100	60,16	0,211
110	65,28	0,218
120	66,98	0,220
130	67,94	0,220
140	67,95	0,221
150	67,955	0,221

Studies on the influence of the duration of the process on the selective dissolution of copper with sulfuric acid with a concentration of 130 g/l from the composition of the product show that at the beginning of the process (up to 20 min.), the transition of copper into the solution is accelerated, and after 30-60 min, the dynamic equilibrium in the process of selective dissolution occurs (Fig. 2). The rate and diffusion of many given chemical reactions increase with temperature. As the temperature increases, the concentration of copper, nickel and zinc in the solution slowly increases. However, since the temperature reaches 40℃, the rate of extraction of copper, nickel and zinc increases rapidly with the prolongation of the process (Fig. 1). This situation is explained by the rapid formation of $CuSO_4$ at high temperatures.

It can be seen from the time dependence of the release of metals into the solution that the optimal value of the duration of the dissolution of metals is 25-30 min. amounted to 99.6% of copper in the solution.

Thus, the following optimal conditions for the selective dissolution of metal compounds from the precipitate obtained from the processing of technological solutions were determined: the concentration of sulfuric acid is 125-130 g/l, the temperature is 45-50℃, the duration of the experiment is 0.5 hours, S:Q=4:1, mixing speed 150 rev/min. In such cases, the level of separation of copper into the solution is 99.6%.

Conclusion. Thus, the selective dissolution of copper from the precipitate obtained from the processing of technological solutions with sulfuric acid ensures the environmental safety of this technology:

1. Selective smelting with sulfuric acid during the processing of non-magnetic fraction provides extraction of metals from waste and complex processing.

2. The duration of selective dissolution is 0.5 hours, and the concentration of sulfuric acid is 125-130 g/l. The rate of separation of copper into the solution is 99.6%.

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