

## INDUSTRIAL WASTE WITH COPPER CONTENT AND PROSPECTS FOR THEIR PROCESSING

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**Abstract.** *In these days, the world demand for copper is increasing day by day. This requires the development of new innovative methods of copper production, emphasis on accelerating the scope of work aimed at improving the complete separation of copper metal from the ore as much as possible*

**Keywords:** *metallurgical production enterprises, copper-containing industrial waste, consumption of basic and auxiliary raw materials, hardware chain, man-made waste, product cost, primary material, copper, ore.*

**Introduction.** In these days, the world demand for copper is increasing day by day. This requires the development of new innovative methods of copper production, emphasis on accelerating the scope of work aimed at improving the complete separation of copper metal from the ore as much as possible. The total amount of man-made waste generated during the production of copper and zinc in the conditions of “Almalyk MMC” JSC is 1.5 billion estimated to be close to a ton.[3,4,5]

The composition of this technogenic waste is mainly found in the form of copper production industry waste, copper production industry cakes and copper smelter sludge. This article provides information on hydrometallurgical extraction of copper from copper-containing waste produced as industrial waste at the metallurgical production enterprises of "Almalik mining-metallurgical combine" JSC. And at the same time, it was mentioned that the processing of industrial waste containing copper is somewhat more economically efficient and ecologically safe, and technologically simple and convenient compared to the extraction of copper metal from primary raw materials. In this case, we can clearly see that the simplification of multi-stage technological processes from ore to finished product has been proven in the article. The compactness of the sequence of processes, the shortness of the equipment chain, the short time it takes to get the finished product, the saving of the consumption of the main and auxiliary raw materials several times compared to the traditional standards, and the reduction of the cost of the product with high economic efficiency are considered to be one of the most visible achievements. [1,2,6]

### **Methods and object of research.**

As an object of research, industrial waste containing copper was taken in the molybdenum tailings in the slurry field of the Scientific and Production Association for the Production of Rare Metals and Hard Alloys of “Almalyk Mining and Metallurgical Complex” JSC. The work is based on the study of the composition of molybdenum soot copper-containing waste, its selective smelting, various methods of precipitation and the choice of the resin required for sorption selective smelting. For this purpose, the amount of copper metal in the molybdenum waste in the sludge field belonging to the Scientific Production Association was determined using the SPECTRO ARCOS FHX22 (ISP-MS) device shown in picture 1.



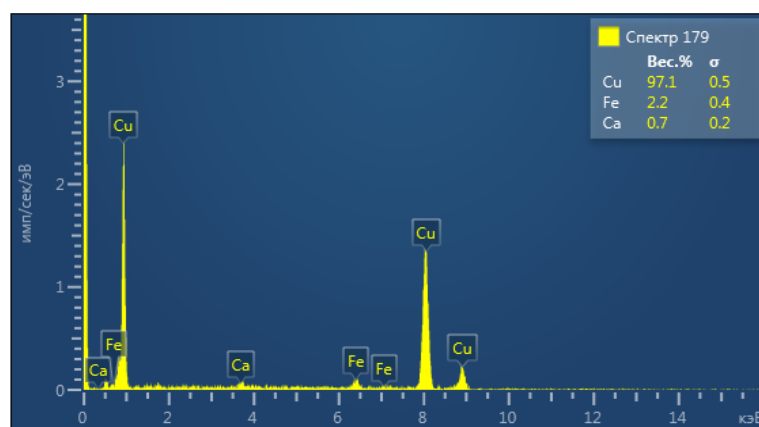
**Picture 1. SPECTRO ARCOS FHX22 (ISP-MS)**

The results of the quantitative analysis of the solution samples in the turbid field number 2, 3, 4 are presented in table 1.

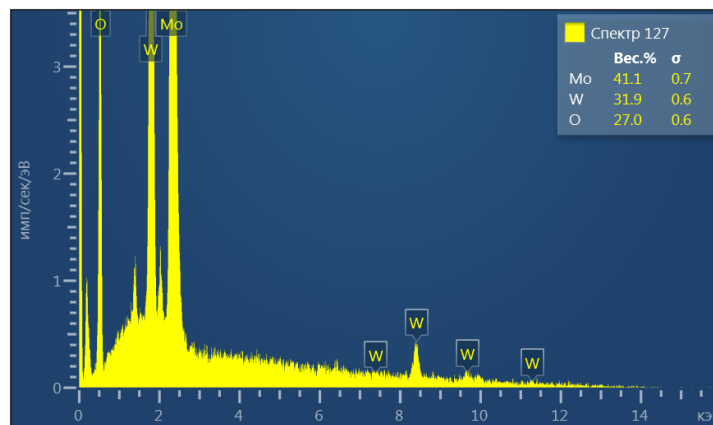
*Table 1*

№ Sample	The solution medium is at pH	Cu	Zn	Mo	W	Re	NO <sub>3</sub> <sup>-</sup>
		mg/l					g/l
2	5,8	1159	49	325	256	23	168
3	2,6	1244	34	272	283	21	155
4	1,8	788	17	85	79	18	423

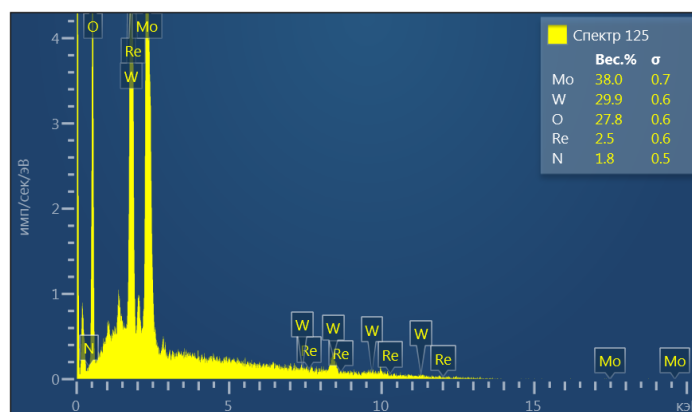
It was found that the use of the sorption method in extracting copper from the solution has an economic effect. The solution with the determined content was sent to sorption columns under laboratory conditions, and during the sorption process, S930 resin of the PURELITE company was used. In figures 2-5, the mass fraction of the elements contained in the solution determined using spectrum analysis of the SPECTRO ARCOS FHX22 (ISP-MS) device is cited in %.



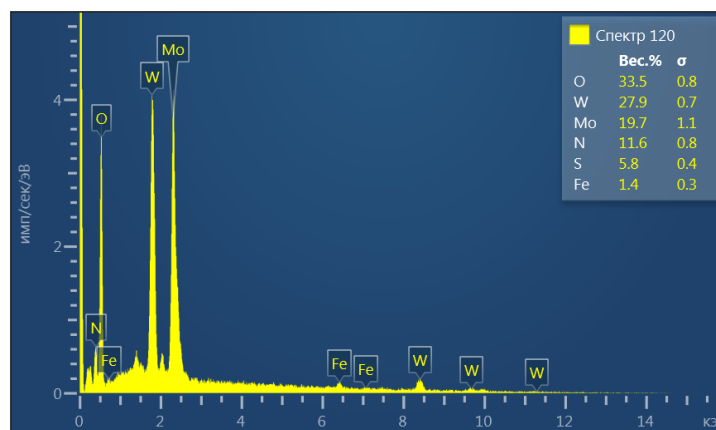
**Picture 2**



*Picture 3*



*Picture 4*



*Picture 5*

**Research justification. Research justification.** The following operations were carried out to extract copper from the content of man-made waste: man-made waste was affected by 20% nitric acid and a recyclable solution was obtained. The solution was filtered and treated with ammonia to obtain a solution with a pH of 8.0-8.5. Then the sorption process was carried out with the help of S930 tar, and the copper oxide contained in the tar was desorbed using 22% nitric acid. Copper (II) hydroxide was obtained from the resulting copper nitrate using sodium alkali, and this hydroxide precipitate was heated to a temperature of 450-600°C to obtain Copper (II) oxide. Copper (II) oxide was reduced with hydrogen to obtain copper metal.

### **Research results and their analysis.**

The pyrometallurgical method is widely used in the industry to extract copper metal. This requires a complex and multi-stage technological sequence. In pyrometallurgical processes, the temperature is high and the amount of gases released into the atmosphere is high. The results of the research show that extraction of copper metal from man-made waste by hydrometallurgical method is clearly distinguished by the simplicity of the technological chain, somewhat less consumption of auxiliary and basic raw materials, and environmental safety. This leads to a decrease in the cost of products, increasing economic efficiency in all respects.

**Conclusion.** The advantages of the proposed technology include: simplicity of the technological scheme, low energy consumption, high copper extraction levels from the content of man-made waste, low reagent consumption, environmental friendliness and a short time interval from raw materials to finished products.

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