The American Journal of Engineering and Technology
(ISSN – 2689-0984)
Published: February 28, 2021 | **Pages:** 116-122
Doi: https://doi.org/10.37547/tajet/Volume03Issue02-17

IMPACT FACTOR
2021: 5. 705
OCLC - 1121105677

Improvement Of The Technology For Extracting Tungsten Industrial Products From The Stale Tailings Of The Ingichkin Factory

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ABSTRACT

In policy actions on further development of the Republic of Uzbekistan defines the task of "Improving industry to a qualitatively new level of deep processing of local raw materials, the acceleration of the production of finished products and the development of technology" One of those challenges is the use of stale tails Insistently factory " in the form of raw materials of non-ferrous and rare metals that have accumulated in tailings Insistently factory. Its processing will significantly expand the raw material base without significant capital expenditures.

The extraction of tungsten from the stale tailings of processing plants and waste from metallurgical production is an urgent issue in the world practice of ore mining and processing of tungsten concentrates.

KEYWORDS

Technogenic waste, stale tailings, extraction, concentrate, prom.product, capital costs, additional extraction, desliming, perechislenie operations, separating time, pulpotomy, cosmelenia, granulometric composition, the classifier

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INTRODUCTION

Continuous improvement of the technology of processing of mineral raw materials, the use of more advanced methods and techniques, the choice of optimal technological schemes allow economically justified selection of previously unpromising waste profitable for processing. In addition, man-made waste occupies vast areas of land, which includes well-developed arable land, urban areas, non-irrigated pasture lands, changing the natural landscape and forming peculiar landforms.

MAIN PART

Technogenic waste from ore enrichment creates an increased environmental hazard by its negative impact on the air basin, underground and surface waters, and the soil cover over vast territories. However, using them as additional sources of ore and mineral raw materials will significantly reduce the scale of disturbance of the geological environment in the region.

Additional extraction of tungsten from the stale tailings of enrichment is carried out in the following way. The tails of gravity enrichment are first re-milled and then de-silted in a classifier, the resulting materials are separated on hydraulic classifiers.

After classification, the resulting classes are enriched separately by concentration tables. The coarse-grained tailings are then returned to the grinding cycle, and the fine-grained tailings are thickened and re-enriched on concentration tables to produce the finished concentrate. After that, the industrial product received for additional grinding and tailings are sent to flotation. The concentrate of the main flotation is subjected to re-cleaning. The starting material contains 0.3 to 0.5% 〖WO〗_3; tungsten recovery reaches up to 96%, with about 72% of the tungsten recovered by flotation. At the same time, the content of tungsten in the flotation concentrate does not exceed 10-12% 〖WO〗_3.

For research samples were taken from Mature tailings Insistently concentrator. The chemical analysis of the selected samples was carried out in the Central Analytical Laboratory of JSC " Almalyk Mining and Metallurgical Combine".

The results of the chemical analysis and mineralogical composition of the stale tailings are given in Table 1.

For carrying out laboratory experiments, we prepared attachments with a total weight of 500 kg, which were carefully averaged. Then she has produced 5 of the tailings samples Insistently concentrator weighing 50 kg. The prepared samples were subjected to a sieve analysis.

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Table 1

The chemical composition of the tailings Insistently concentrator

Elements and oxides	Content %	Elements and oxides	Content %
SiO_2	48,55	CO_2	6,64
Fe_2O_3	14,70	S general	1,28
K_2O	0,80	Mo	0,02
Na_2O	1,20	As	0,01
CaO	18,95	Pb	footprints
MgO	2,21	Cu	0,02
Al_2O_3	3,96	Zn	0,001
TiO_2	0,14	The amount	100,0
P_2O_5	0,11	FeO	10,42
MnO	1,40	SO_3	0,15
WO_3	**0,066**	Loss on ignition	6,76

The small class and the large class were separately enriched on a screw separator, then on a concentration table without perechist operations. The weight of each sample is 50 kg, the ratio of T:W -31:3, 1:4, 1:5 The prepared samples were enriched on a screw separator and on a concentration table without re-cleaning. A satisfactory result was obtained at T:W-1:4. (Table.2)

As a result of the experiments with stale tails, a tungsten industrial product containing 10-12.1% WO_3 was obtained.

Table 2

Study of the influence of T:W in the gravitational method of enrichment of stale tailings of the Ingichkin processing plant

№ p.p	**Product name**	**Output j, %**	**Content β, WO_3,%**	**Extraction Ɛ, WO_3,%**
I T:W=1:3	Tungsten industrial product	0,54	4,2	37,9
	Tails	99,46	0,04	62,1
	Source product	100,0	0,06	100,0
II	Tungsten industrial product	0,29	12,1	59,2

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T:W=1:4	Tails	99,71	0,02	40,8
	Source product	100,0	0,06	100,0
III **T:W=1:5**	Tungsten industrial product	0,37	7,4	45,6
	Tails	99,63	3,62	54,4
	Source product	100,0	0,06	100,0

The following experiments were conducted to study the effect of perestroika operations. The first experiment was carried out on a screw separator and with one re-cleaning on a concentration table. The second experiment was conducted on screw separator and two re-purifications at a concentration table. The third experiment was carried out on a screw separator with one re-cleaning and two re-cleaning on a concentration table. The results of the experiments are shown in Table 3

In the experiments of gravity enrichment in combination with the Petrov method, an effective suppression of calcium-containing minerals was achieved, however, difficulties were identified in suppressing the apatite mineral with a decrease in the total extraction of tungsten into the concentrate, an industrial product with a content of 3-6% WO_3 was obtained and its further processing is not effective. It was also revealed that the proposed combined method requires heating the pulp to a certain temperature, the use of expensive flotation reagents, such as oleic acid, foaming agent T-92, concentrated hydrochloric acid and xanthogenate. Therefore, for the enrichment of stale tailings, the use of the Petrov method is not acceptable.

Table 3

The results of studies on the impact of roughing operations at enrichment jigs tails Insistently concentrator

№ p.p	**Product name**	**Output j, %**	**Content β, WO_3,%**	**Extraction ε, WO_3,%**
I	Tungsten industrial product	0,14	27,8	66,7
	Tails	99,86	0,02	33,3
	Source product	100,0		100,0
II	Tungsten industrial product	0,14	29,2	68,2
	Tails	99,86	0,02	31,8
	Source product	100,0		100,0

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III	Tungsten industrial product	0,12	35,1	71,9
	Tails	99,88	0,02	28,1
	Source product	100,0		100,0

The next series of experiments with a weight of 50 kg each were carried out in the following order: pulp preparation, enrichment on the jigging machine, the jigging concentrate after re-cleaning is sent to the concentration table.
Jigging is one of the most common methods of gravity enrichment of minerals. The scope of application covers minerals in terms of the density of the extracted components from 1200 to 15600 $\boldsymbol{kg/m^3}$ and in terms of the size of the enriched material from 0.2 to 50 mm for ores, and from 0.5 to 120 (sometimes up to 250) mm.

We assume that the use of a jigging machine in combination with a concentration table for gravity enrichment can give encouraging results in separation, and also contributes to the production of higher-quality tungsten industrial products. Experiments were carried out using the gravity method, which includes a jigging machine with a re-cleaning and a control jigging, then the product is enriched on a concentration table, preferably with two re-cleaning. 2

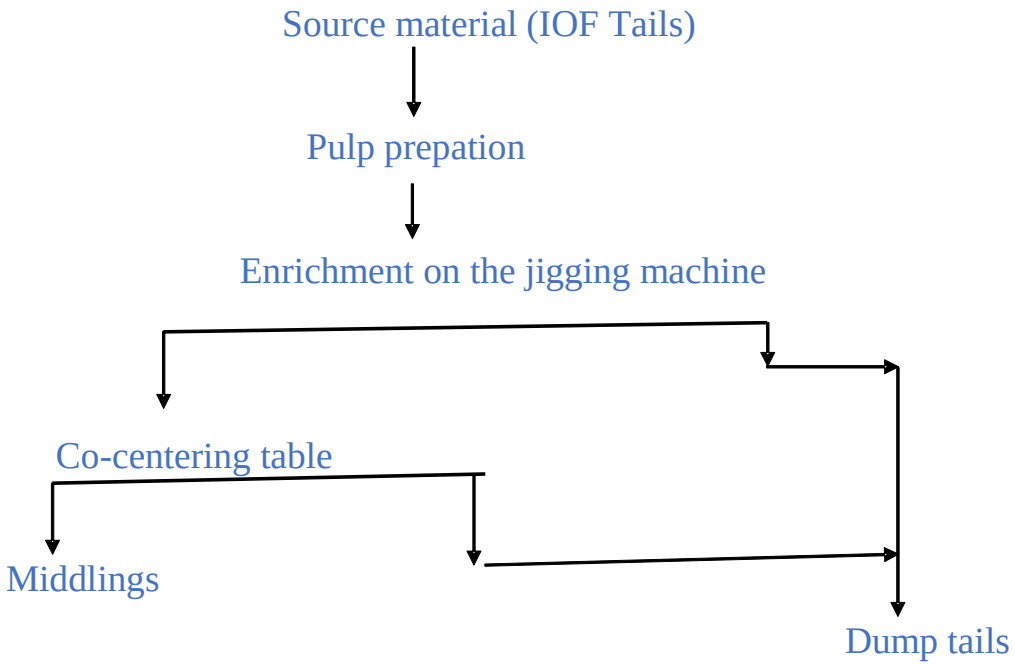

Fig. 1 Technological scheme for the enrichment of stale tailings in an open cycle by the gravity method

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the production of higher-quality tungsten industrial products. Experiments were carried out using the gravity method, which includes a jigging machine with a re-cleaning and a control jigging, then the product is enriched on a concentration table, preferably with two re-cleaning. 2

As a result of the experiments conducted, it was determined that the most effective method of enriching the stale tailings of the Ingichkin processing plant is a combined method of enrichment,consisting of gravity enrichment, which includes a jigging machine with a perechistka and a control jigging in the technological scheme, then enrichment on a concentration table with two perechistki. (fig.2)

It was revealed that the application of the proposed technological scheme for the enrichment of stale tailings of the Ingichkin processing plant will make it possible to obtain industrial products containing up to 35.1% WO_3. According to this scheme, a tungsten industrial product was obtained from the stale tailings of the Ingichkin processing plant on a jigging machine and on a concentration table.

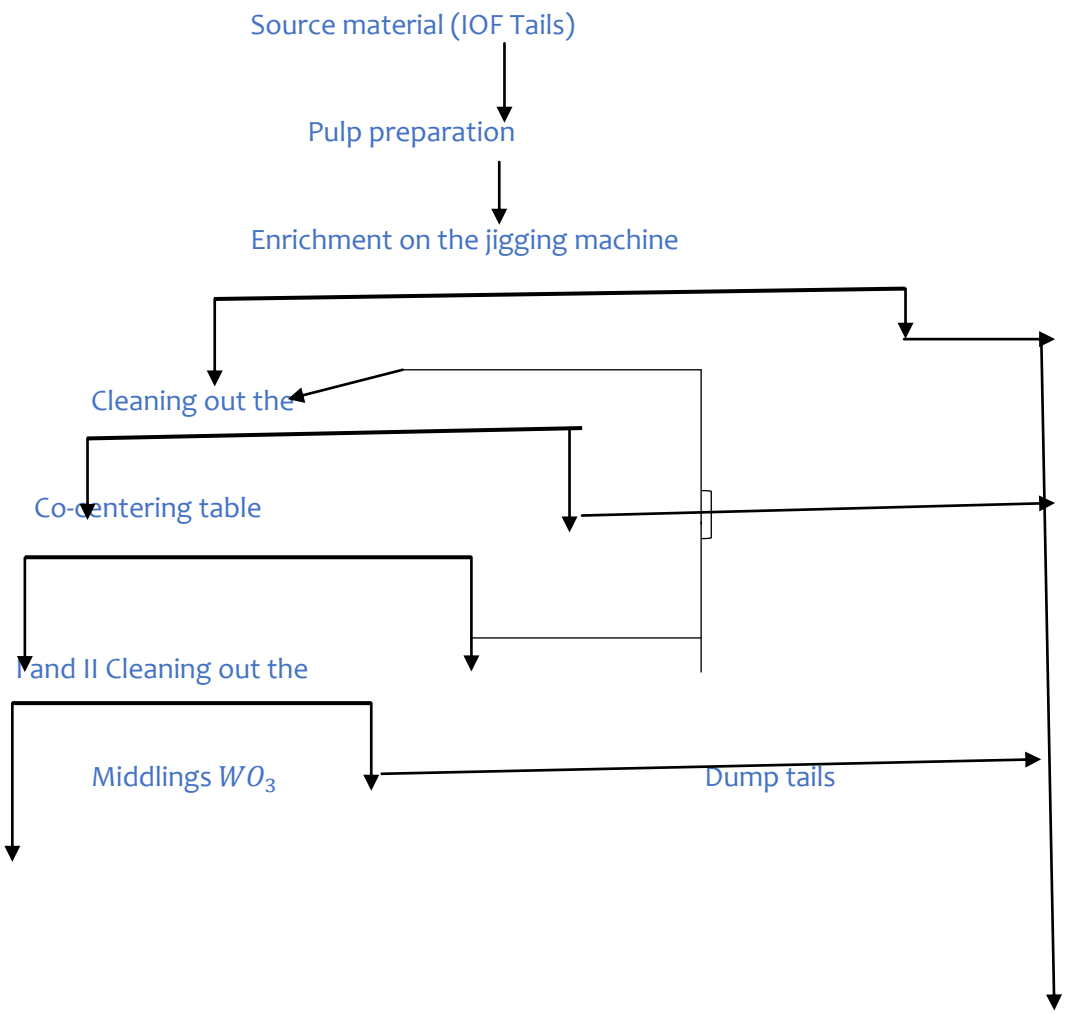

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Fig. 2 Technological scheme of enrichment of stale tailings of the Ingichkin processing plant by the gravity method on a jigging machine.

CONCLUSION

Based on the results obtained, it can be concluded that the most effective method of gravitational enrichment of stale tailings is a technological scheme that includes the processes of jigging with re-cleaning in jigging machines and enrichment on a concentration table with two re-cleaning.The advantages of the studied technological scheme of enrichment include the simplicity of conducting technological processes, as well as reducing the cost of equipment maintenance and obtaining tungsten industrial products with a content of 27,8-35,1% WO_3 .

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