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SELECTIVELY TRANSFER THE MOLYBDENUM CAKE TO THE SOLUTION WHEN WORKING WITH THE SODA METHOD

Abdullayev Alisher Abdulkasimovich
Mamatova Farangiz Qodir qizi
Khakberdiyev Shukhrat Makhramovich
alisher3058364@gmail.com
Jizzakh Polytechnic Institute

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Abstract:

The soda method in the processing of molybdenum waste is a relatively inexpensive method that ensures the extraction of molybdenum and allows the use of equipment made of corrosion-resistant unprotected steel.
In many enterprises, caustic soda is used to decompose concentrates contained in molybdenum, which are not aggressive when cleaning cakes and do not require anti-corrosion equipment.

Keywords: Alkali, ore, concentration, caustic soda, hydrolysis, solution.

INTRODUCTION

In an alkaline environment, sodium hypochlorite oxidizes all sulfide minerals, in particular molybdenite. Oxidation with sodium hypochlorite solutions mainly includes sour molybdenum ores and concentrates, iron and copper sulfides. Sodium hypochlorite oxidizes at a temperature of 20-40 ^{0}C less than molybdenite. However, iron hydroxide and especially copper hydroxide catalyze the Oxygen release process of hypochlorite in the medium [1-2].

Catalytic decomposition of hypochlorite occurs rapidly at 80 C, so its consumption is theoretically much higher than the sulfides required for oxidation, since part of the oxygen released is released from the solution without reacting. Therefore, concentrates are treated with sodium hypochlorite solutions at a temperature not higher than 40 C. with an increase in the concentration of hypochlorite and alkali, the oxidation state of molybdenite decreases.

The high extract of molybdenum in an oxidizing solution with sodium hypochlorite solutions is also achieved in the processing of sour mines containing 0,015 % mo (93 %), when selective dissolution of molybdenum products from 5 to 23 % is released into 96–98 % mo solutions if the process is carried out by percolation [3].

The advantages of using sodium hypochlorite to separate molybdenum from ores and sour concentrates are that the reagent has the ability to oxidize molybdenum and obtain a high amount of molybdenum into the solution at low processing temperatures.

However, one of the disadvantages of the method is the high consumption of hypochlorite. Theoretically, it is necessary to spend 1 kg of hypochlorite on 7 kg of raw materials. Practical consumption is 1,5-2 times higher. Meanwhile, the cost of hypochlorite is relatively high [4].

M. Ya. Topilsky, I. Or. Andreytseva K. I. Smirnov developed a method for transferring soda-hypochlorite to a solution. Cakes are treated with a soda solution in the presence of calcium hypochlorite or chlorinated lime. The transition from a sodium molybdate solution to an ammonium molybdate solution is carried out through a joint. of research on the selective transfer of hypochlorite to solution with the development of optimal conditions for the processing of various molybdenum products. Jordanov i m I A.N. Zelikman led.

The process of converting molybdenum products into a selective solution of hypochlorite occurs through the following equation

$MoS_2 + 9NaOCl + 3Na_2CO_3 = Na_2MoO_4 + 9NaCl + 2Na_2SO_4 + 3CO_2$ (1)

Through hypochlorite, molybdenum products with a number of advantages were selectively transferred to a solution using the chlorine-soda method. The process of selective transfer of chlorine-soda to a solution of molybdenum products can be represented by the following general reaction [5].

$MoS_2 + 9Cl_2 + 12Na_2CO_3 = Na_2MoO_4 + 18NaCl + 2Na_2SO_4 + 12CO_2$ (2)

LEARNING TO CHOOSE CAKES

In many enterprises, caustic soda is used to decompose the concentrates contained in molybdenum, which are not aggressive when cleaning cakes and do not require anti-corrosion equipment.

In many enterprises, caustic soda is used to decompose concentrates contained in molybdenum, which are not aggressive when cleaning cakes and do not require anti-corrosion equipment.Experiments were carried out to alkalize molybdenum cakes with caustic soda [6].

At a temperature of 450-500 ^{O}C, the process of burning in the oven was carried out. The combustion process takes 1 hour, and the amount of molybdenum in the initial "waste"is equal to 7,18 %. At the same time, soda in different proportions is added to the suspension, mixed and alkalized. Alkalization with Soda was carried out in a mechanical mixer at high temperatures, the temperature of the solution reached 60-70 ^{o}C. B:L ratio 1:3 and 1:4 were provided. The selective transfer to the solution is carried out in two stages.

After filtration, the molybdenum content in the liquid and solid phases was determined. Table 1 provides data on the composition of the cake in the Central Laboratory of the Almalyk Mining Metallurgical Combine.

Table 1 results of the analysis of the initial cake and the cake under investigation after laboratory classes on soda hydrolysis.

№	Analysis of the almalyk Mining Metallurgical Combine
	Mo, %
Cake that comes out	7,18
5	0,94
6-2	1,88
7	3,13
7-2	3,5
12	1,84

Previously, laboratory work was carried out on washing cakes with soda solutions with a concentration of 120 g/l, a sample of 50 g is placed in a heat-resistant flask, and after each stage of the solution, the solution is replaced with a new one with a solution of soda with a concentration of 120 g/l, performed in three stages Table 2 presents the results obtained by the method of concentrated drawer of a solution of 120 g/l of soda. The initial mo content in the cake is 7,18% [7].

Table 2 results of hydrolysis of cakes with a solution of soda with a concentration of 120 g/l

№	Analysis Mass, g	Na_2CO_3 consumption, g/l	Mo composition after analysis, %		Outgoing mo content, %
			General Mo	Mo	
1	50	120	2,72	1,11	71,2
2	50	120	4,6	2,4	50,0
3	50	120	4,7	2,1	49,4

From the data of Table 2, it follows that as a result of three alkylating cakes with a soda solution, the amount increases from 49,4 % to 71,2 %.

Table 3 presents the results of research on the alkalization of cakes. The optimal mode of cake processing with Soda is set.

To transfer molybdenum from cakes to the solution, 30 % of the soda content is enough.

Table 3 results of laboratory work on the processing of molybdenum cakes

№	Analysis Mass, g	Na_2CO_3 consumption, g	Stage of transfer to selective solution	Weight of samples after transfer to selective solution, g	Mo composition after transfer to selective solution, %		B:L	Analysis in the liquid phase, g/ l		
					General analysis	Ammonia		I Stage	II Stage	III Washing stage
1	50	8	2	38,5	4,8	2,3	1:3	8,9	2,65	0,93
2	50	9	2	39,2	3,7	2,1	1:3	9,35	4,5	1,32
3	50	10	2	40,1	3,1	1,5	1:3	9,0	4,8	1,7
4	50	12	2	38,5	1,45	0,29	1:3	8,62	2,2	0,55
5	50	15	2	40,8	2,1	0,55	1:3	9,7	3,86	1,8
5-1	50	15	2	40,6	1,82	0,146	1:3	11,62	0,97	0,45
5-2	50	15	2	40	1,45	0,105	1:3	20	5,8	2,58

№	Analysis Mass, g	Na_2CO_3 consumption, g	Stage of transfer to selective solution	Weight of samples after transfer to selective solution, g	Mo composition after transfer to selective solution, %		B:L	Analysis in the liquid phase, g/ l		
					General analysis	Ammonia		I Stage	II Stage	III Washing stage
5-3	50	15	2	38,8	1,6	1,667	1:3	24	9,7	1,95
6	50	20	2	39	1,0	0,29	1:3	27,3	7,63	0,97
6-1	50	20	2	38,5	1,8	0,829	1:3	26	6,8	1,15
6-2	50	20	2	40,3	1,2	0,53	1:3	17,7	10,7	1,46
7-1	50	25	2	37,7	1,7	0,60	1:3	29,28	5,5	1,53
7-2	50	25	2	38,6	4,7	1,1	1:3	30,26	7,32	0,68
7-3	50	25	2	37,2	3,3	1,3	1:3	18,78	4,196	1,51
10	50	15	2	41,5	2,0	0,88	1:3	12,5	6,2	1,32
11	50	15	2	41,5	2,2	0,8	1:4	16,2	4,32	0,65
12	50	15	2	41,2	1,74	1,0	1:4	12,6	4,7	1,52
12-1	50	120	2	46,0	5,8	2,96	1:4	13,1	4,51	0,72
16	50	8	2	38,6	4,329	2,284	1:4	9,76	4,88	1,1
17	50	8	2	37,5	4,04	0,9204	1:4	12,68	5,612	0,98
18	50	6	2	40,0	3,8	0,35	1:4	5,978	2,83	0,78
19	50	5	2	41,0	4,5	0,58	1:4	8,54	3,51	1,07

Experiments were carried out on the alkalization and separation of the molybdenum institution with soda. Combustion was carried out in a blast furnace at a temperature of 450-500 °C. The duration of alkalization is 1 hour, the amount of molybdenum in the initial substance is 36,5 %. The total amount of the sample was 50 g.

Table 4 results of chemical analysis of molybdenum substances

Analysis	**Amount of elements, %**							
	Mo	Cu	SiO_2	P	WO_3		MoS_2	Re
Molybdenum (MoO_3)	36,5	1,79	9,32	0,011	-	0,012	0,65	0,0092

At the same time, soda in different proportions was added to the suspension, mixed and alkalized. Alkalization with Soda was carried out in a mechanical mixer, the solution temperature reached 60-70 °C. The concentration of the Soda solution is 120 g/l. The B:L ratio remained in the 1:3 and 1:4 ratios. Selective transfer to the solution was carried out in two stages and washed. After filtration, the molybdenum content in the liquid and solid phases was determined. The results are presented in Table 5.

Table 5 results of laboratory work on processing

№	Analysis Mass, g	Consumption Na_2CO_3 g	Molybdenum products			
			Liquid medium, g/l			Harsh environment, %
			I Stage	II Stage	Industrial Solvent	
1	50	50	67,7	29,2	4,88	2,2
2	50	40	73,2	14,6	2,92	2,9
3	50	30	54,9	13,4	1,5	3,9
4	50	25	67,1	14,6	5,2	9,7
5	50	20	57,9	17	2,1	12,0
6	50	120 g/l	64,05	23,79	14,64	1,6

As can be seen from Table 5, the transition of the selected molybdenum to the solution after alkalization with soda will be from 54,9 to 73,2 g/l.

Development of a technological scheme for waste processing

Based on the research carried out, a technological scheme for the processing of waste molybdenum cakes was proposed. The technological test scheme for processing molybdenum cakes with soda includes the following basic processes.

- alkylation of the return cake with caustic soda;
- separation of cakes;
- filtering cakes.

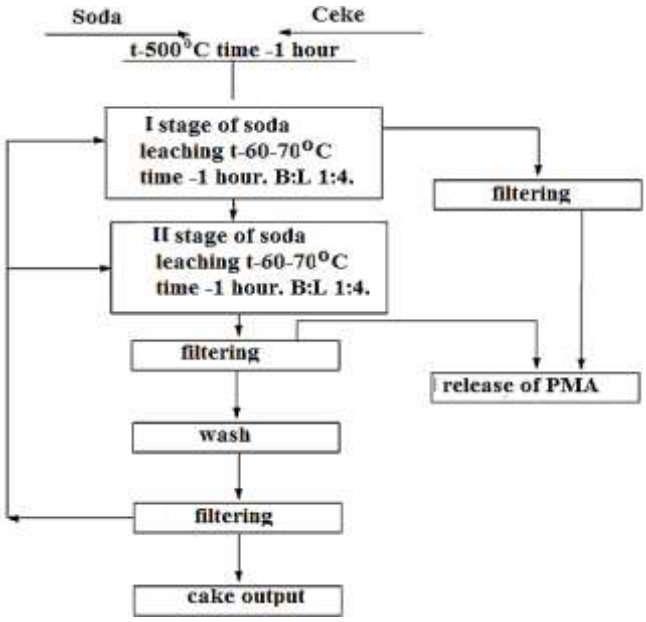

Figure 1 technological scheme for processing molybdenum cakes

Course of work: 50 g of cake is mixed with soda and alkylated in a glass reactor for 1 hour at a temperature of 450-500 ^{O}C. The thinner was placed in a heat-resistant glass and alkylated in a heated mechanical mixer, in two stages the temperature of the solution reached 60-70 ^{o}C.

To determine the composition of molybdenum and copper, samples of liquid and solid phase B:L Ratio 1:4-1:5 were taken. The unallocated part of the cake was re-alkalized.

Figure 1 shows the optimal mode of operation for cakes with molybdenum content. The optimal mode of the cake processing process is calculated according to the sample weighing 50g and caustic soda in an amount of 15 g.

DISCUSSION OF THE RESULTS OBTAINED

Above, for the advantages of the soda method in the processing of molybdenum waste, alkaline hydrometallurgy was chosen - a relatively inexpensive reagent has been identified that provides high molybdenum separation and allows the use of steel equipment without Anticorrosive protection.

From the cakes, a molybdenum solution was obtained in a solution from 11.6 to 40,26 g/l. the ratio of cake and soda was studied from 1:0,16 to 1:0,4. At the same time, a decrease in molybdenum below 3% was achieved in return Cakes by weighing: the soda ratio is considered optimal at 1:0,24 and higher.

At the time of alkylation of the unburned ppm, a solution with a molybdenum content from 3,1 g/l to 16,3 g/l was obtained. At the same time, an increase in molybdenum concentration is observed in cakes.

As can be seen, the melting of other elements is observed and, therefore, there is an increase in molybdenum concentration in cakes. In order to increase the solubility of molybdenum from ppm, a series of experiments were carried out to clean ppm from flotation reagents. Washed with water until the first PPM boils. Foams containing the resulting flotation oil and other organic products were separated and dried. PPM was mixed with soda in appropriate proportions and alkalized. A solution containing 16,3 g/l of molybdenum was obtained. The amount of molybdenum in cakes is in the range of 29-33%.

By combining two cakes, medium alkalization was carried out. In this case, a solution with a molybdenum content of 13,2 g/l was obtained. The amount of molybdenum in cakes is 33,5%.

From the above experiments, it follows that in order to obtain molybdenum from ppm more efficiently, it is necessary to activate, after which alkalization is carried out.

USED LITERATURE

1. Шегай А.А.,Шарипов Х.Т.,Шегай М.А. Технология молибдена и материалов на его основе. Т., Изделство «Фан ва технология»; 2010,- с.205
2. Abulkasimovich A. A., Khodyevich K. S. Recycling of molybdenum waste by hydrometallurgical method //Eurasian Research Bulletin. – 2022. – Т. 11. – С. 1-4.
3. Абдуллаев А. А. Олтин қазиб олиш корхоналари чиқиндиларини флотация усулида тозалаш //Журнал естественных наук. – 2022. – Т. 1. – №. 1 (6). – С. 179-183.
4. Зеликман. А.Н. Молибден. М:, Издателство «Металлургия», 1970. – 440 с.
5. Абдуллаев А. А. Олмалиқ кон-металлургия комбинатидаги молибден сақлаган кекларини қайта ишлаш жараёни //Science and Education. – 2022. – Т. 3. – №. 1. – С. 225-228.

6. .Abdullaev A. A. et al. Molibden sanoati chiqindilarining inson va atrof–muhitga ta’siri //Журнал естественных наук. – 2021. – Т. 1. – №. 4.
7. 7.Абдуллаев А., Хамидов С. Олтин ажратувчи фабриканинг атроф муҳитга таъсири //Журнал естественных наук. – 2022. – Т. 1. – №. 2 (7). – С. 325-329.