SCIENCE AND EDUCATION IN KARAKALPAKSTAN

ҚОРАҚАЛПОҒИСТОНДА ФАН ВА ТАЪЛИМ

ҚАРАҚАЛПАҚСТАНДА ИЛИМ ҲӘМ ТӘЛИМ

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EXPLORING THE METHOD OF SELECTIVE UNDERGROUND MELTING

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Summary: *In recent years, there have been trends in the expansion of enterprises specializing in the extraction of metals, which is likely to remain in line with the long-term, long-term plans of large enterprises. Most small gold and other metal mining companies do not have such prospects. However, without replenishing the subsoil, the underground resources will continue to run out. For small businesses, it is advisable to adopt a new technology of selective smelting of deposits, as this method has a number of technical and economic advantages over traditional technologies of gold mining.*

Keywords: *selective underground smelting method, solution, ore mass, filtration, gold, chlorine, sodium hychlorite, iodine, bromine, super toxicity, high chemical activity, composite materials, rocks, chloridion, decomposition, pipe set observation pipes, stationary mode, until one, debit current.*

Globally, the method of selective smelting of tubular underground has been developed on the basis of selective smelting technology, preparation process, layer opening and metal extraction, selective smelting systems in top-drilled pipes. piping system. The solution is then filtered in the ore mass, and the enriched solution is taken up by a system of suction pipes and transported for further processing.

In addition, the complete or partial dehydration of ores in the selective smelting of tubular underground, the dependence of holes and cracks on the mineralization of the ore, which provides the permeability of the ore. selective smelting is also being carried out underground under the pipeline. The method of selective smelting of metals underground has a number of advantages in choosing the method of development of deposits. These include:

- Preservation of the natural landscape (absence of excavations and quarries, non-washing of sands) is a factor that reduces the risk of direct contact of workers with rocks during operation, injuries during production.
- Removal of many technological processes from the production system (mining, transportation to concentrators, crushing, crushing, concentrating, hydrometallurgical processing of concentrates)
- 2-4 times reduction of capital expenditures in mining construction
- Possibility to organize the initial smelting of low-concentration metals;
- Possibility to use deposits of strong dehydrated rocks;
- Involvement of poor and off-balance sheet ores for open pit mining;
- Absence of waste and waste storage facilities that pollute the environment;
- Fully automated surface processing and mining of technological solutions.
- Improving the quality of technical and economic indicators in mining.

The technological process of selective underground smelting production also consists of a number of problematic issues, including;

- The complexity of the schematic diagram of the selective smelter;
- Difficulty in selecting environmentally and economically optimal reagents for selective underground leaching;
- Research stages;
- Research and development work to improve the techniques and technology of selective underground smelting;
- Study of the raw material base.

ECONOMICALLY AND ECOLOGICALLY ACTIVE REAGENTS FOR SELECTION OF GOLD UNDERGROUND.

At present, the main reagent for the extraction of gold from ores in hydrometallurgical processes is sodium cyanide. The increasing demand for environmental protection, especially the attention paid to the method of selective smelting underground, determines the urgency of finding reagents with low toxicity in the smelting of gold. Examples of such solvents are active halogenated reagents in the free halogen state and in the hypochlorite state. In addition, the use of cyanide is acceptable only for visible and finely dispersed gold.

Due to the high environmental requirements for selective underground smelting, the use of ore preparation and cyanides as solvents has been practically removed from the agenda.

Due to technological aspects, the use of cyanides to dissolve gold in heavy cyanides, which are highly soluble and in shale deposits, is highly inefficient. and oxidants (potassium or sodium hypochlorite, potassium permanganate, manganese dioxide).

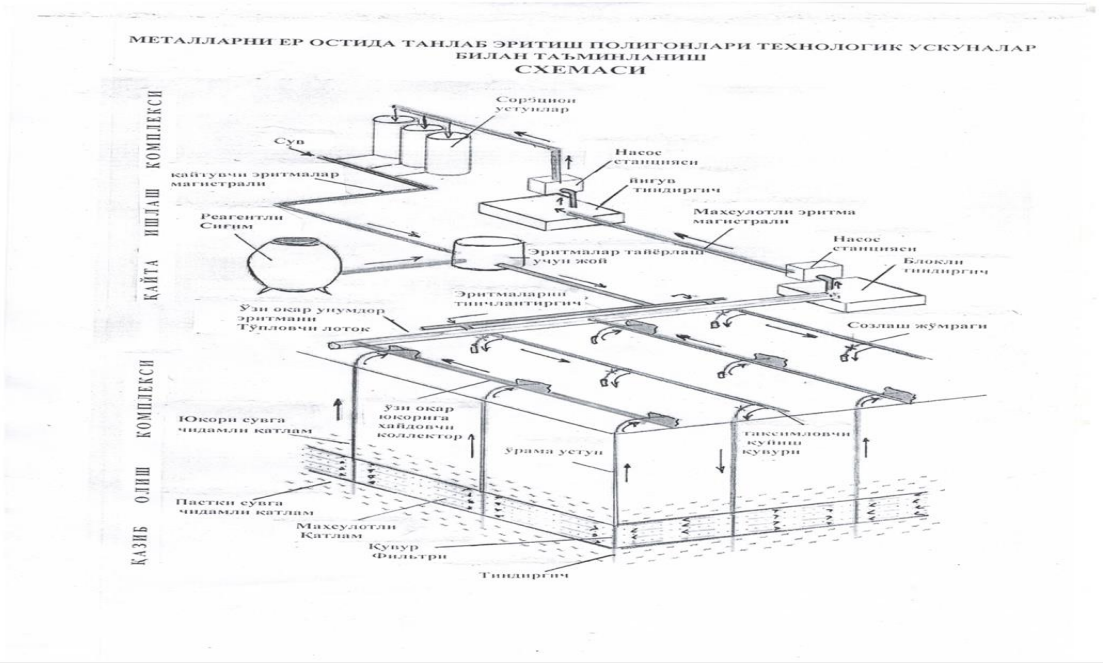

Figure 1. Advantages of selective gold smelting chloride system are as follows

- High oxidation activity;
- Ability to process gold-bearing materials at a higher depth, which allows to obtain a high level of gold;
- Availability of reagents and their low cost;
- Availability of reagents at the production site.

Disadvantages:

- Use of corrosion-resistant system in all technological processes;
- the complexity of processing and disposal of solutions.

Analysis of the scientific literature on the use of chlorine in the production of hydrometallurgical plants shows that the consumption of chlorine is more than 1-2 kg / g of gold obtained and the selective smelting time does not exceed 1-2 hours. increases.

The amount of silver interferes with the degree of extraction of gold from gold-bearing materials. If gold contains 30% or more of silver, i.e., the amount is 700 and below, the transition of gold to chlorinated solutions is completely stopped due to the screen formed of silver chloride around the gold.

The ecological principles of the use of chlorine in selective underground smelting show that, despite the extreme toxicity of active chlorine with its properties, its high chemical activity, its rapid

decomposition to non-toxic chloride levels when combined with gold-bearing materials and rocks, and its high instability.

The presence of small amounts of toxic compounds in the productive horizons of selective gold smelting facilities may accumulate in solutions exceeding the permissible concentration in the case of selective smelting with chlorine solutions. Such toxic compounds include mercury, arsenic, cadmium and non-ferrous metals. In this case, additional measures should be taken to neutralize them. Toxic compounds can also be present in ordinary groundwater.

Iodine and the iodide system are needed as iodine-oxidizing, iodide-complexing complex and gold-forming complex.

The iodine and iodide system has a number of advantages, including low toxicity, high stability of soluble complexes, and low redox potential compared to solvents used in the selective smelting of gold in other cyanide-free systems.

Many researchers are proposing an iodine-iodide system for the process of selectively smelting gold as an alternative to the cyanide process, as a promising system.

The ability of bromides to dissolve gold has long been known. In the early twentieth century, the widespread popularity of cyanide technology halted research and scientific studies on the development of a bromide system for the extraction of gold from gold-bearing materials. The use of bromine as a solvent is being considered at a new stage due to the increasing focus on environmental protection against the use of the cyanide method.

In January 1987, the Great Lakes Chemical Corporation of the United States received a patent for the process of extracting precious metals from raw materials using a bromine compound called gidantion.

The advantages of iodide and bromide systems are:

- high kinetics of gold melting and its increase in the process in an acidic environment;
- high production of gold;
- non-toxic concentration of solutions used in selective dissolution;

Disadvantages;

-Corrosion activity in the use of acidic media in the process of selective melting;

- High intake of rock solutions (cost);
- High cost of alloys.

Iodine and bromide regeneration is one of the prerequisites when using iodide and bromide methods and requires the selection of non-deficient oxidants, which is a very problematic issue. However, due to the possibility of complete regeneration in the process of selective leaching underground, it is possible to involve iodine and bromine in the process. Today, the solution to the problem of developing technology for the extraction of iodine and bromine from industrial wastewater and their subsequent use is close to reality.

Compared with other halogen systems, the chlorine-chloride method shows a clear advantage of the former.

The results of experimental production tests of the method of selective underground smelting are based on scientific literature on gold hydrometallurgy and the authors' research experiments on technological testing of gold-bearing ores at various facilities. criteria for the evaluation of deposits for the method of selective smelting underground with chlorinated solvents were developed. Chlorinated solutions include: chlorinated water, solutions of hypochlorites, additives of chlorides containing active chlorine and chlorides of metals (with or without them), other reagents,

Which solvent is used is not important for the evaluation criteria.

Conditionally divided into very convenient, convenient and inconvenient criteria according to the level of convenience.In addition, there are a number of factors that affect the economic and basic possibilities of using the method of selective smelting underground.

Sodium hypochlorite has the advantage of benefiting from hypochlorite in terms of safety compared to liquid chlorine. Sodium hypochlorite solution can be prepared directly in the

workplace by electrolysis from an aqueous solution of sodium chloride, and electrolysis can be carried out in a continuous and intermittent mode. When conducting research on the selection of reagents, for each specific case, their effectiveness in autonomous and mixed variants should be evaluated.

RESEARCH STAGES OF GOLD UNDERGROUND SELECTION METHOD

In the objects selected on the basis of the method of selective underground melting, it will be necessary to conduct research in the following stages:

-laboratory research;

-advanced laboratory research;

- conducting experiments on the selected mining area;

-scheduled experimental and production tests;

- Research and development tests to improve the technique and technology of the underground selective smelting method.

At the stage of laboratory research, the mineral, chemical, granulometric composition of the sample is determined, followed by technological research.

In the first stage of technological research, a number of experiments on static (agitational) selective dissolution of the studied sample are carried out. Such experiments make it possible to determine the proximity of the solvent solution to the optimal composition by selecting a small amount of material and to determine the maximum amount of metal extraction from a specific sample.

It is known that the time required to reach the equilibrium concentration of the active substances does not exceed one day. at the end of the experiments, the average amount of gold obtained from the samples for all solutions is calculated.

According to the data of static tests, the consumption properties of the reagents are determined approximately.However, it is advisable to perform these experiments to control the quality of the final composition of the solvents in the solution.

Based on laboratory tests, the following geotechnological properties of gold-bearing materials are determined:

-filtration coefficient;

- degree of metal extraction from ore;

-S: Q ratio required to obtain the maximum amount of metal;

-characteristics of solvent costs (1 g. For the obtained metal in kg, for 1 ton of processed rock, in kg);

- average amount (concentration) of metal in productive solutions mg / l;

-Solution scheme of solutions.

At present, the staff of the Navoi State Mining Institute and representatives of NMMC Mining Department No. 5 have successfully conducted research on the selective smelting of complex metals in used uranium pipes, and a completely new approach to underground smelting technology is being developed.

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Rezyume: *Keyingi yillarda metall qazib olishga ixtisoslashgan korxonalarni kengaytirish tendentsiyalari kuzatilmoqda, bu esa yirik korxonalarning uzoq muddatli, istiqbolli rejalariga muvofiqligicha qolishi mumkin. Aksariyat kichik oltin va boshqa metall qazib oluvchi kompaniyalar bunday istiqbolga ega emas. Biroq yer osti boyliklarini to‘ldirmasdan turib, yer osti boyliklari tugashda davom etadi. Kichik korxonalar uchun konlarni tanlab eritishning yangi texnologiyasini qo'llash maqsadga muvofiqdir, chunki bu usul oltin qazib olishning an'anaviy texnologiyalariga nisbatan bir qator texnik va iqtisodiy afzalliklarga ega.*

Резюме: *В последние годы наметились тенденции к расширению предприятий, специализирующихся на добыче металлов, что, вероятно, останется в соответствии с долгосрочными, долгосрочными планами крупных предприятий. У большинства мелких компаний, занимающихся добычей золота и других металлов, таких перспектив нет. Однако без восполнения недр подземные ресурсы продолжат иссякать. Для малого бизнеса целесообразно освоить новую технологию селективной плавки залежей, так как этот метод имеет ряд технико-экономических преимуществ перед традиционными технологиями добычи золота.*

Kalit so'zlar: *selektiv er osti eritish usuli, eritma, ruda massasi, filtrlash, oltin, xlor, natriy hixlorit, yod, brom, o'ta toksiklik, yuqori kimyoviy faollik, kompozit materiallar, tog 'jinslari, xloridion, parchalanish, quvurlarni kuzatish quvurlari, statsionar rejim, biri, debet joriy.*

Ключевые слова: *селективный метод подземной плавки, раствор, рудная масса, фильтрация, золото, хлор, хихлорит натрия, йод, бром, сверхтоксичность, высокая химическая активность, композиционные материалы, горные породы, хлоридион, разложение, трубный комплекс наблюдательных труб, стационарный режим, до один, дебетовый ток.*