



METHODS OF ENSURING THE INCREASE IN THE QUALITY OF EXTRACTION OF NON-FERROUS, RARE, RARE EARTH METALS

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Abstract: Most metals are excessively TiO_2 present inevitable problems in titanomagnetite concentrates. problems are observed in subsequent melting processes. Currently, this problem cannot be solved using traditional mineral processing technology is gaining importance. In short, metallurgy-enrichment combination strategy has proven to be an effective way to reduce incoming TiO_2 in Technology. The following technologies described: Synthesis of a new foaming agent to enhance flotation beneficiation ores containing gold; multi-component microflotation that allows for the amplification extraction of precious metals in existing mines and new, relatively poor and previously economically unpromising deposits; beneficiation of permanent gold-bearing ore by flotation; A contractile pyrometallurgical selection that allows the direct melting of permanent raw material containing gold with the transition of arsenic to the gas phase; sulfur and other volatile components, then their neutralization and concentration from gold, silver and other non-ferrous metals in matte solution; constant conversion copper mat in the Vanyukov furnace; Processing of liquid metallurgical slag in a electric heated coke filter furnace; purification by vacuum distillation selenium; extraction of rare earth metals from phosphoric acid extraction obtained during phosphorite processing; processing high-grade low-grade bauxite.

Keywords: Titanomagnetite concentrate, metallurgical-concentration combination, microflotation, to heat up, copper, rare earth metals, selenium, alumina, bauxite, magnetic separation.

Introduction

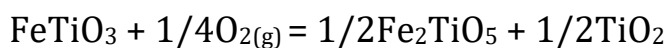
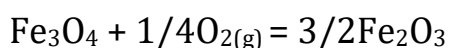
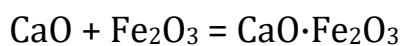
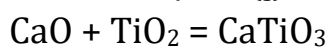
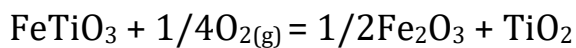
The Republic of Uzbekistan is one of the countries rich in natural resources. Almost all elements of the periodic table in its depth, most of them in industrial quantities: copper, aluminum, lead, zinc, cadmium, chromium, molybdenum, rhenium, selenium, tellurium, gold and other non-ferrous and rare metals are found. As a result, currently, metallurgy is the basis of the republic's industrial



power and export potential. Participation according to the properties of metals It is of urgent importance in the processing of refractory, complex mineral and man-made raw materials has been a problem for the metallurgical industry worldwide. Industrial development of such raw materials limited due to lack of effective and cost-effective technologies in several countries. Most important at the moment the problem of the metallurgical industry is the development and implementation of innovative technologies to allow maximum complete extraction of non-ferrous, rare and rare earth metals contained in ores; I think it is necessary to increase industrial enterprises focused on industrial waste and secondary raw materials. In the case of iron ore, titanomagnetite is used as an alternative ore for steel smelting, as high-grade iron ores are gradually becoming scarcer. However, due to the unique crystalline structure, the level of TiO_2 inevitably increases in titanomagnetite concentrate, causing similar problems As the temperature of the liquid increases, the reducing effect of the ore decreases and becomes viscous slag melting. In the traditional steel industry, additional ordinary iron ore is mixed titanomagnetite concentrate reduces the TiO_2 level at higher ratios, but does not prevent undesirable conditions. TiO_2 in titanomagnetite concentrate. However, for this method, there must be a level of titanium in the titanomagnetite concentrate Should be below 1%. Direct reduction-magnetic separation melting is also well developed, but its disadvantage is that it requires high temperature to satisfy high metallization degree. In addition, sodium salt-frying is used to directly reduce melting, but this process consumes a large amount of sodium salt, which leads to a high price. The high reaction temperature of reductive roasting (1300–1450 °C) also causes a number of side reactions such as the formation of solid solutions (brookite (Fe_2TiO_5) and black titanium). Dwindling primary ore reserves of various metals around the world are forcing participation resistant to processing, difficult and off-balance ores. One of the main economic criteria of profitability preliminary ore preparation for metallurgical processing of the mine is called beneficiation process. A new foaming agent synthesis technology has been developed to enhance flotation, concentration of gold-bearing ores. The use of fusel oil as a raw material, which is a waste product of alcohol production In Uzbekistan, composite xanthate, Aeroflot and foaming agents are significantly reduced in the process of synthesis. reduces the cost of reagents and significantly improves their flotation properties compared to the main ones. Experimental testing of gold-bearing ore processing technology. modified collector done; a gold concentrate with a gold content of 32.0 g/t was obtained

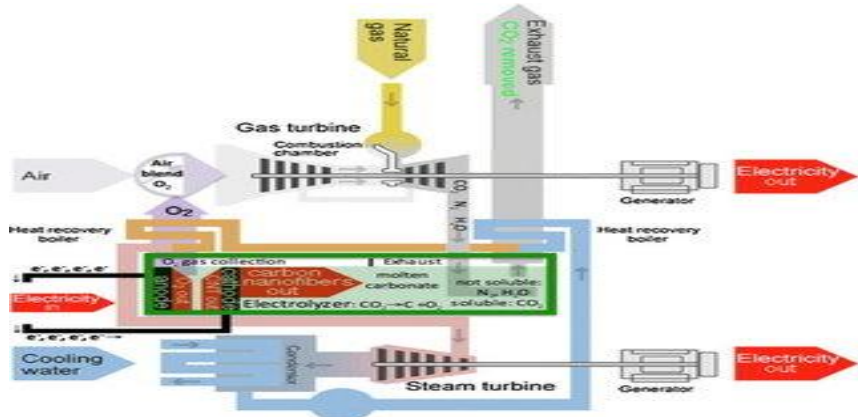


with 85% extraction. Using the new collector increases the gold yield by 4.21%. Gold composition in flotation residues it decreases from 0.3 to 0.5 g/t. Recommended composite collectors are derived from the fusel multi-component oil, effective and cheap. The proposed composite collectors are unique unlike their counterparts, they are cheap, economical reagents. However, for full extraction precious clay minerals from refractory finely dispersed ores and man-made raw materials, it is possible achieved with the combined use of local composite reagents, a method carried out using a turboflotation device. It was a reaction equation module in HSC Chemistry 6.0 thermodynamics software is used to calculate the standard Gibbs free energy change in the experimental reaction, to explain the reactions that occur during the roasting process. Possible reactions known from literature review. The main reactions during heating titanomagnetite can be summarized as follows:

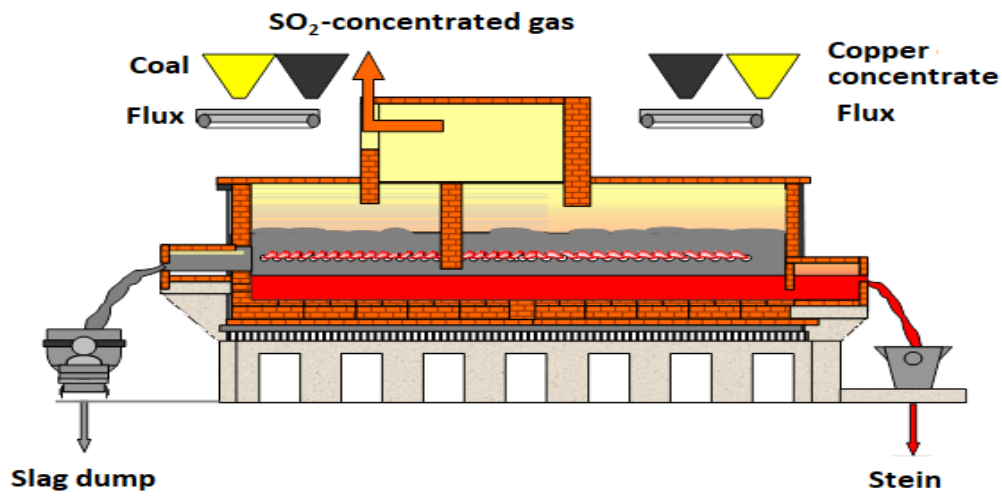


Implementation of the proposed "multi-component microflotation" technology in mining and significantly increases the production of precious metals in places where metallurgical complex enterprises exist development of mines, relatively poor and previously economically unpromising new mines. to solve the problem of enrichment of finely dispersed minerals increases the competitiveness of products in the world the market takes a leading position in the promotion of innovative technologies both at home and abroad. A flotation concentration technology has been developed for refractory gold bearing ores The gold extraction process of gravity and flotation concentrates with the presence of an oxidizing agent was studied. Technological scheme of gold extraction using persistent flotation beneficiation method The ore containing the gold is shown in Picture 1. The results of stepwise flotation ore concentration suggest such a possibility. Recovery of gold tailings from flotation with a gold content of less than 0.5 g/t. Combined gold mining gold content in the concentrate (gravity-flotation) is 35.7 g/t 80%. First time exposure a modified oxidizer (mixture of calcium hypochlorite and trichloroisocyanuric acid) A gravity concentrate with a gold recovery of 77.5% was studied; from flotation concentrate - 56.6%, which is 4% higher than the base. Ore-phase transformation of iron-titanium solid solution by oxidation is shown Picture 1 . It appeared as a result of adding

CaCO₃ to the roasting system under an oxidizing atmosphere in the phase change reaction of iron-titanium solid solution ore in TC for production CaTiO₃, Fe₂O₃, Fe₃O₄ and other minerals independent of iron and titanium; thus iron and titanium separated in the solid solution lattice. Meanwhile, the perovskite phase was stable and the lattice structure was low close packing, strong brittleness, and weak adhesion to the iron phase, resulting in favorable conditions process is used to further magnetically separate iron and titanium.



Picture 1. Sequence of technological processes



Picture 2. Diagram of a two-zone Vanyukov furnace (melting in a liquid bath)

Conclusions

In this work, a metallurgical-concentration combination strategy to reduce TiO₂ in titanomagnetite was offered. Effect of roasting temperature, CaCO₃ ratio and magnetic intensity the separation efficiency of iron and titanium was studied to achieve efficiency separation of iron and titanium in titanomagnetite by oxidation phase change. Experimental results under optimal conditions (roasting temperature = 1350 °C, CaCO₃ ratio = 30%, and magnetic density = 0.21 T), iron and titanium can be effectively separated (Fe level: 53,3% by weight; Fe recovery: 60,5% by weight; TiO₂ level 3 wt%; TiO₂ removal: 84.1 wt%). Thermodynamic calculations indicated that titanomagnetite in the





oxidizing atmosphere It can be oxidized to TiO_2 and CaO reacts with TiO_2 to form perovskite. Thus, the technologies presented in the work have undergone laboratory and experimental tests, some of which are available tested on an experimental scale. Conducted research corresponds to the level of research conducted in the world in the field of metallurgy, and many differ due to the uniqueness of the raw materials of the Republic of Uzbekistan. So for for the first time, the main design parameters and technology of the two-zone Vanyukov furnace were determined, and an overview of the processes was presented. Extraction of selenium from industrial products of processing production has been developed, effectively changed flotation reagents were proposed to increase the extraction of copper and molybdenum to copper-molybdenum concentrate. Using an oxidizer (mixture of calcium hypochlorite and trichloroisocyanuric acid) helps to increase gold extraction. Otelbayev Azizbek, a student of the Nukus Mining Institute at the Navoi State University of Mining and Technology, has articles on metallurgical processes, components of metals, and metal enrichment processes. Much research has been done on the metallurgical industry. A number of information on processes in metallurgical deposits, extraction of metals, corrosion of metals and extraction of metals by flotation methods are presented.

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