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Improved Process Control System Of Flotation Of Potash Ores

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ABSTRACT

This article discusses the perfect control system for the process of flotation of potash ores. The search for optimal solutions for technological processes in practice is one of the main directions of technical development

KEYWORDS

Flotation, modeling, optimization, technology, automation, production, fertilizer, computer.

INTRODUCTION

In the global industry, research and development in the field of manufacturing, modeling and optimization of technological processes in the context of modern scientific and technological progress has allowed the industry to increase productivity by reducing energy consumption and improving product quality through the extensive use of modern technologies in the creation of high-performance, reliable and cost-effective technological equipment. At the same time, the search for optimal solutions for technological processes in practice is one of

the main directions of technical development aimed at increasing productivity, improving product quality, reducing costs, easing working conditions and protecting the environment.

The main direction in the technology of enrichment and automation of modern potash flotation plant processes is to obtain high-quality fertilizers with minimal losses of useful substances and high technical and economic indicators.

The production of fertilizers with improved physical and chemical properties is due to the needs of agriculture, the economy of production and increased demand on the world market. Therefore, improving the technology of potash ore dressing by developing and implementing more developed technological schemes, new high-performance and efficient equipment, reagent modes, and full automation of production processes is currently relevant and in demand [1].

MATERIALS AND METHODS

The production of mineral salts of fertilizers is one of the most important tasks of the chemical industry. The range of mineral fertilizers used in agriculture, the chemical industry itself, metallurgy, pharmaceutical production, construction, and everyday life, is hundreds of names and is constantly growing. The scale of salt mining and production is exceptionally large, and for some of them it amounts to tens of millions of tons per year. Compounds of sodium, phosphorus, potassium, nitrogen, aluminum, iron, sulfur, copper, chlorine, fluorine, and others are produced and consumed in the largest quantities. The largest-tonnage is the production of mineral fertilizers. The largest consumer of salts and mineral fertilizers is agriculture. This is due to the fact that modern intensive agricultural production is impossible without applying to the soil a scientifically justified amount of various mineral fertilizers containing elements that are not enough in the soil for normal plant growth, in particular grain. Mineral fertilizers are called [2].

In the Republic, some work has been done to reduce energy consumption and ensure high production efficiency and increase the productivity of technological equipment and devices based on high-performance

technologies for the production and management of systems. In the resolutions of innovative development of the Republic of Uzbekistan for 2019-2021 "...introduction of the organization mechanism for conducting research and development work on the program-target principle using project management mechanisms" 1. In this aspect, it is of particular importance, in particular, to improve technology, enrich existing minerals, use new, more efficient technological equipment, as well as create and apply environmentally safe methods of extracting valuable metals.

Flotation (from the English word flotation – pop – up) is one of the most common methods of mineral enrichment. The flotation process is based on the different ability of the surfaces of minerals that are part of the ore being processed to be wetted with water. During flotation, air bubbles are blown through the suspension of the enriched ore. Particles of non-wettable minerals stick to the bubbles and float to the surface, from which they are removed in the form of mineralized foam. And the water-soaked particles sink to the bottom.

RESULT AND DISCUSSION

Thus, the flotation separation of the mineral components of the ore being processed is carried out. Initially, the flotation method was used for the enrichment of natural ores consisting of minerals that are insoluble in water (sulfide oxides, insoluble salts). The flotation method for enriching potash salts became widespread after it was shown that the separation of these salts can be carried out in their saturated solution. The technical solution to the problem of separating water-soluble salts by flotation is one of the most important achievements of science and technology in recent decades. Especially great

success in this area was achieved with the flotation enrichment of silvinitite [2].

Automated process management is considered and developed in a complex with the technological scheme, taking into account the high requirements of automation to technology and technology to automation. Automatic control and management of the processes of enrichment sylvinite potash ore at the factory is recommended on the basis of the precision of modern means of automatic control and control using industrial PC and microprocessor controllers as part of APCS for optimally designed algorithms.

The use of experimental and analytical identification methods, as well as analytical modeling methods, allowed us to formalize reliable models of the optimization object. This allowed us to develop a perfect control system for the flotation of potash ores. The introduction of optimal control parameters for the flotation device reduces the amount of over-regulation in the control system, reduces the amplitude of maximum deviations in the concentration of valuable components in the output pulp and foam layer, and reduces the frequency of fluctuations in the output parameters of the flotation device. Based on the work performed, losses of raw materials and valuable components in flotation tailings are reduced by 0.01%.

As a result of this research work, using the method of multi - stage system analysis, mathematical and computer models of the dynamics of the flotation process are obtained, taking into account the consideration of processes in both single-capacity and multi-capacity representations of the object.

The use of experimental and analytical identification methods, as well as analytical

modeling methods, allowed us to formalize reliable models of the optimization object. This made it possible to develop a perfect flotation process management system.

CONCLUSION

The introduction of optimal control parameters in the second flotation device reduces the amount of over-regulation in the optimal control system, reduces the amplitude of maximum deviations in the concentration of valuable components in the output pulp and foam layer, and reduces the frequency of fluctuations in the output parameters of the flotation device.

Based on the work performed, the loss of raw materials and valuable components in the flotation tailings is reduced.

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