

RESEARCH OF AN AUTOMATED CONTROL SYSTEM FOR THE TECHNOLOGICAL PROCESS OF FLOTATION OF COPPER-PORPHYRY ORES.

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Abdug'aniyeva Yulduzoy Shahabiddinovna

Senior teacher of "Mathematics and Informatics" department of TashDTU Olmaliq branch

Abstract

This article deals with the investigation of automated process control system for flotation of copper-porphyry ores and ores.

Key words

Industry, automation, project, copper-porphyry, technological processes, non-ferrous metal, mineral.

Modernization of existing enterprises of chemical, food and other branches of industry and creation of new ones envisages the implementation of large-scale works related to solving various issues of automation of production processes. Development of automation systems and implementation directly into production processes is a multi-stage process. It includes scientific research, design and assembly-adjustment works, as well as a set of activities that ensure reliable operation of automation systems during operation. The issues to be solved in the automation of the production processes of modern production require experts to know the principles of the structure and operation of various automation devices, the methods of making different types and classes of automatic systems, as well as the work in the field of automation of technological processes. also requires acquisition. This means that a logically calculated and technically based system of automation of a technological process should be expressed in a language that is equally understandable for specialists who are engaged in the issues of installation, adjustment and use of automation systems. In this case, all specialists should have a unified understanding of the automation system being created with tools, implementation of given adjustment laws, methods of assembling tools and automation tools, transfer of impulse and command lines, and source lines.

Sulfide minerals are the main source for the production of non-ferrous metals both now and in the future: copper, copper-molybdenum, copper-pyrite, lead-zinc

polymetallic ores. In recent years, deposits with a higher content of copper have been discovered, but the amount of copper in mined and processed mines is decreasing. Copper is one of the metals that occurs freely in nature, and due to the very few deposits of this metal, it has lost its importance as a source of copper. Currently, the main part of copper is extracted from minerals containing compounds with various elements. Copper and copper-porphyry minerals belong to the type of minerals that can be easily enriched. The used scheme and technological procedures depend on the type of ore being processed, the composition of copper minerals, their condition and susceptibility to leaching, the presence of primary slurries and soluble salts, as well as the nature of mixed rocks. The main method of beneficiation of copper-porphyry ores is flotation. The successful use of this method is associated with good flotation of most copper minerals. Similar ore deposits that have been discovered so far belong to the type of endogenous or exogenous deposits. Among them, there are more endogenous deposits divided into magmatic, metasomatic and hydrothermal. Among them, hydrothermal deposits are more important. The purpose of technological research is to determine the possibilities of separating copper and iron sulphide minerals from primary copper porphyry ore into a collective concentrate for obtaining copper residues. A sample of primary copper-porphyry ores from the Sarichoqqi mine was used as a technological sample. The presented product is gradually crushed, sorted, mixed, and then separated into samples for studying the material composition of the ore and conducting technological research.

Flotation of copper-porphyry ores can be done by chemical flotation method. During the flotation process of copper-porphyry ores, several steps are performed to separate particles of different properties from the ores.

1. Product preparation: Chemical reagents, water and many other components are used in the flotation process of copper-porphyry ores. These reagents are used to separate the ore into hydrophobic and hydrophilic parts.

2. Mechanical amalgamation: Ores are separated into large ones by means of mechanical amalgamation. In this process, displacement, concentration increase and particle separation rate are set.

3. Adding reagents to the flotation source: Chemical reagents are added to react with the ores. Reagents interact with particles and cause them to separate.

5. Concentration: As a result of the flotation process, the concentration of separated ores is increased. In this process, the separated ores become a highly concentrated product.

The method of flotation of copper-porphyry ores can be carried out with the help of a computer control system, making the process automatic. Such systems automatically control particle separation, reagent addition, and concentration. In this case, the control of the process becomes easier and allows obtaining a high-quality product.

The automated control system of copper-porphyry ore flotation technological process provides easy and clear production, analysis and control. These systems perform the flotation method automatically.

The automated control system controls copper-porphyry ores in the following stages:

- Separation of ores: Analyzes ores and separates their chemical and physical properties.

- Determination of reagents: The auto-selection system automatically determines the amount, external conditions and chemical strength of reagents. This allows to optimize the conditions of use of reagents in the flotation process.

- Control of technical parameters: technical parameters (temperature, payment period, determination of copper-porphyry ore separation and concentration linings) are controlled during the process within the automated control system.

- Data analysis and report analysis: Process data is automatically analyzed and reports are generated. This helps to optimize the technical process, identify errors and monitor their reduction.

Automated control systems comprehensively run the task of increasing the concentration and generation of copper-porphyry ores. These processes allow to make the activity automatic, efficient and high-quality.

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