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TECHNOLOGY OF MOLYBDENUM SEPARATION FROM TECHNOLOGICAL SOLUTIONS IN URANIUM-CONTAINING DEPOSITS

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Abstract
This article analyzes the technology of extracting molybdenum from technological solutions formed from uranium deposits. Molybdenum is an essential element for the metallurgical, chemical and electrical industries, and its extraction methods, including precipitation, ion exchange, extraction and electrolysis processes, are described. The efficiency, environmental and economic aspects of these processes are also discussed. Improving the technology of extracting molybdenum will contribute to efficient resource use and reduced industrial waste.

Keywords: Molybdenum, uranium deposits, technological solutions, precipitation, ion exchange, extraction, electrolysis, environmental sustainability, economic efficiency.

Introduction

Molybdenum is an essential metal used in industry. It is mainly used to increase hardness and strength in steel production, electrical engineering, the chemical industry, and aerospace technology. This element's high melting point and corrosion resistance characterize it.

Molybdenum is also found in technological solutions formed during the enrichment and processing of uranium ores. Its extraction process is of strategic importance, serving to meet industrial needs for molybdenum, treat wastewater, and ensure environmental sustainability. The proper organization of the molybdenum extraction process allows for the efficient use of resources and increased economic efficiency.

Figure 1. Image of pure molybdenum metal.

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1. The importance of separating molybdenum from uranium ores

• Molybdenum is a valuable industrial metal.

• The technological solutions formed during the uranium enrichment process contain molybdenum.

• Its separation helps ensure environmental sustainability and increase economic efficiency.

Figure 2. The process of separating molybdenum from uranium solutions

2. Methods of molybdenum extraction There are several technological methods for extracting molybdenum:

2.1. Precipitation method In this method, molybdenum in solution is precipitated using specific chemical reagents and separated by filtration. The following reagents are mainly used:

• Ammonium salts are precipitated in the form of $(NH_4)_2MoO_4$.

• Purification is carried out by treatment with acid and alkaline solutions.

Example: When ammonium hydroxide is added to the solution formed during uranium ore processing, molybdenum precipitates as ammonium molybdate $(NH_4)_2MoO_4$ and is separated by filtration.

2.2. Ion exchange method: This method separates molybdenum ions using ion exchange layers or resins. During the ion exchange, molybdenum ions are bound to special resins and washed away.

Example: In large-scale uranium separation plants, molybdenum ions are separated using cation and anion resins to form a concentrated solution.

2.3. Extraction method the extraction method is based on separating molybdenum using organic solvents. Molybdenum is separated from the solvent phase and then processed in this process.

Example: An organic solvent based on phosphoric ether separates molybdenum, and the molybdenum remaining in the solution is separated and then recovered.

2.4. Electrolysis method by electrolysis, molybdenum ions are deposited on the surface of the cathode and obtained as pure metal. This method is used to obtain molybdenum with high purity.

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Example: In the electrolytic purification process, molybdenum ions are directed to the electrodes in an acidic environment and separated as pure molybdenum metal.

3. Technological processes and their efficiency

• The efficiency of each method depends on the composition of the technological solutions and the concentration of molybdenum.
• Repeated processes are used to reduce the amount of molybdenum remaining in the waste.
• Combined methods (for example, ion exchange and extraction) can be used for complex solutions.

4. Ecological and economic aspects

• The process of molybdenum extraction helps to reduce the amount of environmentally harmful waste.
• Recycled molybdenum is economically beneficial due to its use in the industrial and metallurgical sectors.

Conclusion

Modern technologies effectively extract molybdenum from technological solutions formed in uranium deposits. Various methods, including precipitation, ion exchange, extraction, and electrolysis, increase the process's efficiency. This process is environmentally and economically beneficial and is important in the metallurgical industry.

References

1. Kuznetsov V. A., Smirnov A. I. "Rare Metals Extraction from Uranium Ores." Metallurgical Journal, 2020.
2. Johnson M. "Molybdenum Recovery Techniques in Uranium Processing." Chemical Engineering Review, 2018.
3. Petrov I. V. "Industrial Methods of Molybdenum Separation." Moscow University Press, 2016.
4. Rashidov B. "Ekstraksiya va ion almashinuv usullarining texnologik asoslari." Toshkent, 2015.
5. Ivanov P., Sidorov A. "Environmental Impact of Heavy Metal Extraction from Uranium Ores." Green Chemistry, 2019.

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