

DEVELOPMENT OF TECHNOLOGY FOR EXTRACTING MAGNESIUM SALTS FROM LOCAL LAKE BRINES: IMPORTANCE, APPLICATIONS, AND RAW MATERIAL REQUIREMENTS

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Annotation:

Magnesium salts play a crucial role in various industrial applications, including agriculture, healthcare, and construction. The extraction of these salts from natural sources, particularly lake brines, presents economic and environmental advantages. This paper discusses the significance of magnesium salts, their applications, the raw

materials required for their extraction, and the importance of utilizing local lake brines. The development of efficient extraction technologies can lead to sustainable resource management and economic growth while meeting the increasing global demand for magnesium compounds.

Introduction

Magnesium is a vital element with broad industrial applications, making its extraction and processing essential for various sectors. Due to increasing demand, the use of local lake brines as a raw material for obtaining magnesium salts has become an attractive solution. The primary objective of this study is to highlight the importance of magnesium salts, their applications, the requirements for raw materials in the extraction process, and the benefits of utilizing local lake brines for sustainable production.

Main Body

1. Importance of Magnesium Salts

Magnesium salts, such as magnesium chloride (MgCl_2), magnesium sulfate (MgSO_4), and magnesium oxide (MgO), have significant industrial and commercial importance. Their relevance is based on the following:

- **Industrial Applications:** Magnesium salts are used in the production of lightweight alloys in the aerospace and automotive industries, contributing to improved fuel efficiency and environmental sustainability. Magnesium oxide, due to its high thermal resistance, is widely applied in refractory materials.

- **Agriculture:** Magnesium sulfate (Epsom salt) is utilized as a soil supplement to address magnesium deficiencies, promoting plant growth and increasing agricultural productivity.

- **Healthcare:** Magnesium compounds are used in pharmaceuticals as antacids, laxatives, and supplements for cardiovascular health and metabolic regulation.

2. Applications of Magnesium Salts

The versatility of magnesium salts extends across multiple sectors:

- **Environmental Management:** Magnesium hydroxide is employed in wastewater treatment as a neutralizing agent, assisting in the removal of heavy metals and impurities.

- **Construction:** Magnesium-based cements offer advantages such as fast setting times and enhanced durability, making them a sustainable alternative to traditional cement.

- **Pharmaceuticals:** Magnesium stearate serves as a lubricant in tablet production, ensuring uniformity and effectiveness of medications.

3. Raw Material Requirements for Magnesium Salt Extraction

To efficiently extract magnesium salts from lake brines, several key factors must be considered:

- **Brine Composition:** The concentration of magnesium ions and the presence of other dissolved salts impact the extraction efficiency and cost-effectiveness.

- **Purity Levels:** High-purity magnesium salts are required for applications in industries such as aerospace and pharmaceuticals. Advanced purification techniques are necessary to achieve the desired quality.

- **Sustainability Considerations:** Utilizing by-products from industrial processes, such as desalination brines, supports sustainable resource use while reducing environmental impact.

4. Relevance of Utilizing Local Lake Brines

Extracting magnesium salts from local lake brines offers numerous benefits:

- **Economic Growth:** Establishing processing facilities near brine sources minimizes transportation costs and creates employment opportunities in the region.
- **Resource Efficiency:** The use of domestic brine sources ensures optimized utilization of available natural resources while reducing dependency on imports.
- **Environmental Protection:** Processing local brines reduces the negative effects of brine disposal, such as soil degradation and water pollution, while promoting eco-friendly extraction methods.

Conclusion

The extraction of magnesium salts from local lake brines presents a promising opportunity to meet the increasing global demand for magnesium-based compounds. With applications in multiple industries, including agriculture, pharmaceuticals, and construction, the development of efficient extraction technologies is crucial for sustainable resource management. By optimizing local resources, reducing environmental impact, and fostering economic development, magnesium salt extraction from lake brines contributes to a more sustainable and economically viable future.

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