DETERMINATION OF Mn ION USING AN IMMOBILIZED ORGANIC REAGENT

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Annotatsiya: Zavodlardan chiqariladigan ifloslovchi moddalarning, jumladan zaharli va kanserogen og‘ir metallarning tirik organizmlar uchun xavfli ekanligi, ularning atrof-muhitga ta’sirini yanada kuchaytiradi. Oqova suvlar tarkibidan marganes (II) ionini aniqlash uchun tolali sorbentlarga immobillangan organik reagentlardan foydalanildi. Monitoring shuni ko`rsatdiki oqova suvlar tarkibidagi marganes ionlarining miqdori fasillarga bog`liq holda o`zgarib turishi va yog`ingarchilik yuqori bo`lgan fasllarda oqova suvlar tarkibida marganes ionlarining miqdori oshganligi aniqlandi.

Kalit so`zlar: sorbsion-spektroskopiya, immobillash, nitrozo-R-tuzi, organik reagenrlar, PPF tola.

Аннотация: Вредные вещества, выбрасываемые заводами, включая токсичные и канцерогенные тяжёлые металлы, представляют угрозу для живых организмов, и их воздействие на окружающую среду усиливает проблему. Для определения ионов марганца (II) в сточных водах использовались органические реагенты, иммобилизованные на волокнистых сорбентах. Мониторинг показал, что концентрация ионов марганца в сточных водах изменяется в зависимости от сезона, при этом в сезон дождей, когда осадки более обильны, уровень марганца в сточных водах повышается.

Ключевые слова: сорбционно-спектроскопия, иммобилизация, нитрозо-R-соль, органические реагенты, волокно PPF.

Abstract: The pollutants emitted by factories, including toxic and carcinogenic heavy metals, are hazardous to living organisms, and their impact on the environment

exacerbates the situation. Organic reagents immobilized on fiber sorbents were used to detect manganese (II) ions in wastewater. The monitoring showed that the concentration of manganese ions in wastewater varies depending on the season, with higher levels observed during the rainy season when precipitation is more abundant.

Keywords: sorption-spectroscopy, immobilization, nitroso-R-dye, organic reagents, PPF fiber.

Introduction. Currently, environmental pollution and the growing demand for clean drinking water are among the global challenges, and the continuous increase in the degree of pollution of the environment and water bodies is causing concern within the international community [1]. Manganese (Mn) is a major redox element in marine sediments and plays a key role in the biogeochemical cycles of carbon, nitrogen, phosphorus, and trace elements. The Mn(II) ion performs vital functions in living organisms, and its concentration, either above or below the permissible level, can have a negative impact on the organism. Manganese deficiency can lead to various neurological diseases, including Parkinson's disease [2-5].

Methodology. Manganese in drinking water, including water from bottled sources as well as groundwater and surface water, has been studied using various methods such as photometric [6-8], extraction photometric [9], extraction-spectrophotometric [10], sorption-spectrophotometric, potentiometric titration, and voltammetric techniques.

Results and Discussion. The method developed in this study helps to achieve the goal of both reducing the emission of pollutants and increasing the detection rate in the analysis of concentration in the electrolytic manganese industry. The Nitroso-R-sol reagent is first immobilized on PPF fibers, and then, the Mn(II) ions in the wastewater are concentrated and detected by forming a complex with the immobilized organic reagent.

The presence of the complex formed by immobilized PPF fibers and Mn(II) ions can be explained by the signal characteristic of manganese ions observed in the diffractograms of the scanning electron microscope (SEM) analysis.

Based on these obtained results, wastewater analysis was conducted. Protecting the environment from pollution and ensuring the sustainable use of natural resources are among the most important ecological issues today. Due to the impact of industrial enterprises, especially metallurgy plants, soil contamination with heavy metals, the effect of waste on plants, and the negative impact of heavy metals on humans and plants, environmental problems are intensifying. These issues remain urgent. Detecting and mitigating negative ecological changes in ecosystems and restoring the balance between nature and society are among the main directions of ecological restoration.

It is known that metallurgy plants are among the leading industrial sectors in terms of their level of harmfulness. The concentration of manganese metals in the wastewater of Almalyk MMC was monitored. The results of the study are presented in Table 1.

Table 1.

Concentration of Heavy Metals in the Wastewater of Almalyk MMC

Heavy Metal	Seasons				Permitted Maximum Limit
	Winter	Spring	Summer	Autumn	
	Average Concentration in Almalyk MMC Water, mg/l				
Marganes	0,340	0,715	0,465	0,680	0,03

Based on the table, the analysis of manganese concentrations revealed the following: in winter, the manganese concentration was 0.340 mg/l, in spring it increased to 0.715 mg/l, in summer it decreased to 0.465 mg/l, and in autumn, it was 0.680 mg/l. It was observed that the manganese concentration significantly increased during the spring season. In the summer, the concentration decreased compared to spring, but in autumn, it was higher than in summer.

Overall, the concentration of manganese in the wastewater of Almalyk MMC varied across the seasons. However, the manganese concentration remained at 0.55 mg/l throughout all seasons.

Conclusion. It can be concluded that heavy metals have toxic properties that negatively affect the health of living organisms, and therefore, continuous ecological

monitoring is required. Additionally, constant monitoring of the wastewater and waste compositions of industrial enterprises and other industrial facilities is essential. The need for developing new, modern analytical methods for detecting heavy metals in wastewater and waste has been demonstrated. The method developed in this study helps to achieve the goal of both reducing the emission of pollutants and increasing the detection rate in the analysis of concentration in the electrolytic manganese industry.

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