

5. INTERNATIONAL HARRAN CONGRESS ON SCIENTIFIC RESEARCH

December 8-10, 2023 Şanlıurfa, TÜRKİYE

Proceeding Book

EDITORS

Assoc. Prof. Dr. Hasan BÜYÜKASLAN
Assist. Prof. Dr. Veysel DELEN

ISBN: 978-1-955094-76-4

www.ubakkongre.com/harran

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20.12.2023

by Liberty Academic Publishers

New York, USA

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Erlina Widiyanti Azis Erlina Pangastuti Muh. Faiz Fawwaz Asir Mutmainna Miftahul Khairunnisa Ranti Ekasari	DESCRIPTIVE STUDY OF KNOWLEDGE REGARDING HEALTH ETHICS IN PHARMACY STUDENTS IN UIN ALAUDDIN MAKASSAR	289
Rashmi Sandhya Mann	SIMULATION STUDY OF LA ₂ NiMnO ₆ DOUBLE PEROVSKITE SOLAR CELLS USING SCAPS 1D	290
Afafe ELABBADI Youssef KANDRI RODI Mouhcine SFAIRA	EVALUATION OF THE ANTICORROSION ACTIVITY OF A QUINOXALINE DERIVATIVE FOR MILD STEEL IN HCL 1M	291
Prerna Pravin Pitrubhakta Vaishnavi Arjun Waghmare Vasudha Chandrashekhar Patil	IMPACT OF CLIMATE CHANGE ON INDIAN AGRICULTURE SECTOR	292
Phani Kumar V. Subhashish Dey	INFLUENCE OF BIO-ENZYME ON STRENGTH CHARACTERISTICS OF SOIL	293
Stanislav Dushkin	STUDY OF THE DYNAMICS OF ION EXCHANGE PROCESSES DURING WATER PURIFICATION	294
Rummana Khan Sherwani Abdul Waheed Saima Gulzar	TRADITIONAL COURTYARD PLANNING IS THE SOLUTION FOR ENERGY EFFICIENCY HOUSING	295
Mouad lazrak Ghita ait baddi Bouchra chebli Btissam mouria Rabha Aissa	TREATMENT AND AGRONOMIC RECOVERY OF AGADIR'S WEEKLY SOUKS WASTE BY COMPOSTING IN A BIOREACTOR	296
Kovtun David	IMPROVEMENT OF THE EXTRACTION PROCESS OF PRECIOUS SUBSTANCES USING ION-EXCHANGE RESINS	297-298
VIGNESH K Murugan Shanthakumar	SURVEY ON THE INCIDENCE OF POWDERY MILDEW OF RIDGED GOURD INCITED BY <i>Erysiphe cichoracearum</i> IN MAJOR RIDGED GOURD GROWING AREAS OF CUDDALORE DISTRICT	299
Zaid Imad Hameed Zainy Amera Mohamed Alrubeii Hamza AL-Khuza	EVALUATION SAUSAGE PREPARED WITH BEETROOT AND CAMEL THISTLE AS A NITRITE SUBSTITUTE	300

IMPROVEMENT OF THE EXTRACTION PROCESS OF PRECIOUS SUBSTANCES USING ION-EXCHANGE RESINS

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National University of Civil Defense of Ukraine

ABSTRACT

The main areas of resource-saving technologies are processes to reduce energy and resource costs of industrial processes. Today, the introduction of industrial waste recycling systems is becoming increasingly relevant to obtain materials from them that can be reused in the technological process. A significant amount of precious substances such as gold, silver and platinum are lost during mining and remain in the tailings of processed wastewater.

Methods of extracting valuable substances from waste are known, such as:

1. Pyrometallurgy is a process based on the thermal decomposition of precious metals at high temperatures. After smelting, to convert the tailings into a molten state, refining is carried out to recover the metals.
2. Hydrometallurgy - involves the use of aqueous solutions known as leaching reagents (cyanide, thiourea, thiosulfate, acids) to isolate, purify and extract precious metals from associated wastewater.
3. Biohydrometallurgy - involves the extraction or recovery of metals using living organisms. Precious metals can be released by bio-oxidation of their sulfide matrix. Microorganisms, including bacteria, fungi and yeasts, can also recover soluble precious metals through biosorption and bioreduction.
4. Electrochemical technologies - the process involves the deposition of metal ions on the surface of the cathode using an electric current.
5. Mechanochemical technologies - the essence of the process is the influence of mechanical forces that activate chemical reactions that lead to the release of valuable metals.
6. Ion exchange method - based on the ability of ion exchange resins to capture precious metal ions. A significant advantage is selective selectivity to specific precious metal ions. This is due to the possibility of introducing the necessary functional groups into ion exchange resins.

The disadvantages of the known processes are significant resource and economic costs, the formation of hazardous substances, and a low percentage of valuable metals recovery.

The use of ion exchange resins in combination with the hydrometallurgical process is promising.

Flotation tailings, concentrates containing rare earth metals, are treated with cyanide solutions. The resulting pulp is fed to the pachuco machines, where it comes into contact with the required ion exchange resin. The resin, which is maximally loaded with precious metals, is sent to the washing stage to separate it from foreign materials. The desorption of noble metals from the saturated resin takes place in a continuous process with the addition of an acidic thiourea solution. Noble metals are removed from the desorbent by hydroxide precipitation, precipitation with metals with higher electronegativity (including, for example, zinc, aluminum and lead) or by electrolysis.

5th INTERNATIONAL HARRAN CONGRESS ON SCIENTIFIC RESEARCH

December 08-10, 2023 / Şanlıurfa, Türkiye

REF : Akademik Teşvik

20/12/2023

İLGİLİ MAKAMA

5. ULUSLARARASI HARRAN BİLİMSEL ARAŞTIRMALARDA YENİLİKÇİ YAKLAŞIMLAR KONGRESİ 8-10 Aralık 2023 tarihleri arasında Şanlıurfa / Türkiye’de 29 farklı ülkenin (Türkiye-96, Diğer Ülkelerden-114) akademisyen/araştırmacılarının katılımıyla gerçekleşmiştir. Kongre 16 Ocak 2020 Akademik Teşvik Ödeneği Yönetmeliğine getirilen “Tebliğlerin sunulduğu yurt içinde veya yurt dışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışında en az beş farklı ülkeden sözlü tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır.” değişikliğine uygun düzenlenmiştir.

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Saygılarımla



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