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## Abstracts

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**BIOSORPTION OF HEAVY METAL Cd (II) FOR THE TREATMENT OF MINING EFFLUENTS THROUGH SODIUM ALGINATE**

**BIOSORCIÓN DEL METAL PESADO Cd (II) PARA EL TRATAMIENTO DE EFLUENTES MINEROS POR MEDIO DEL ALGINATO DE SODIO**

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Gabriela Vena Q.<sup>1</sup>, Lizbeth Huayta C.<sup>1</sup>, Pavel Delgado S.<sup>2,\*</sup>, Yvan Delgado S.<sup>1</sup>, Raúl Zumarán F.<sup>1</sup>

<sup>1</sup>Escuela Profesional de Ingeniería Química, Facultad de Ingeniería de Procesos, Universidad Nacional de San Agustín de Arequipa UNSA, Av. Independencia s/n, phone +5154226447, Arequipa, Perú, [iqumica@unsa.edu.pe](mailto:iqumica@unsa.edu.pe), <http://fip.unsa.edu.pe/ingquimica/Multidisciplinarios>

<sup>2</sup>Instituto del Gas y del Petróleo, Facultad de Ingenierías de la Universidad de Buenos Aires, UBA, Av. Las Heras 2214, phone +54 528 50343, Buenos Aires, Argentina, [www.fi.uba.ar](http://www.fi.uba.ar)

**Keywords:** *Biosorbent, Cadmium, Mining effluents, Sodium alginate.*

**Palabras clave:** *Biosorbente, Cadmio, Efluentes mineros, Alginato de sodio.*

**ABSTRACT**

In this experimental and analytical work, the adsorption of Cd (II) in effluents from the mining sector in Arequipa, Peru was investigated. The mining effluents were monitored, then the characterization of the effluent relative to the amount of Cd (II) was performed, resulting in 10 ppm. Then the treatment of Cd (II) solutions of mining effluent was carried out with the sodium alginate that acted as a biosorbent of the Cd (II) and contact time between the two phases: liquid and solid in a batch system.

Eleven tests were done using the 2K experimental design in the batch system. This method allows the treatment of mining effluents, in a quick way, of how to mitigate the effluent and lower pollution levels so that they can be reused at the plant level and not contaminate the environment.

Sodium alginate has a maximum monolayer biosorption capacity of 0.0735 mg/g. It was possible to remove 91.88% of the Cd (II) contained in the mining effluents.

In the treatments of the Cd (II) solutions by means of the batch system, 0.010 ppm was obtained, acceptable value according to norms for mining reuse and for waters that can be treated with advanced treatment.

\*Corresponding autor: [pavelds1@yahoo.com](mailto:pavelds1@yahoo.com)

# MONITORING OF WATER POLLUTION BY HYDROCARBONS IN THE MIRROR OF BAY OF SANTIAGO DE CUBA

## MONITOREO DE LA CONTAMINACIÓN DE AGUA POR HIDROCARBUROS EN EL ESPEJO DE LA BAHÍA DE SANTIAGO DE CUBA

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Lilliana Mesa M.<sup>1</sup>, José Falcón<sup>2</sup>, Yoana Ruiz<sup>3</sup>, Ramón Arias<sup>4</sup> y Jorge Pérez<sup>1</sup>

<sup>1</sup>Centro de Estudios Multidisciplinarios de Zonas Costeras CEMZOC, Facultad de Construcciones FCO, Universidad de Oriente, Avenida de Las Américas s/n, phone +5322668084, Santiago de Cuba, Cuba

<sup>2</sup>Departamento de Ingeniería Química, Facultad de Ingeniería Química y Agronomía, Universidad de Oriente, Av. de Las Américas s/n, phone +5322640299, Santiago de Cuba, Cuba.

<sup>3</sup>Laboratorio Provincial de Criminalística. Santiago de Cuba, Cuba.

<sup>4</sup>Centro Nacional de Electromagnetismo Aplicado CNEA. Universidad de Oriente, Avenida de Las Américas s/n, Santiago de Cuba, Cuba.

**Keywords:** *Water pollution, Hydrocarbons, Bay, Spectrophotometry, Surface tension.*

**Palabras clave:** *Contaminación de aguas, Hidrocarburos, Bahía, Espectrofotometría, Tensión superficial.*

### ABSTRACT

The coastal areas of Cuba are exposed to oil pollution. The coastal strip of the bay of Santiago de Cuba is an example of the deterioration of its natural resources due to hydrocarbon pollution, so it is important to establish the level of pollution by determining the concentration of hydrocarbons, and propose the appropriate environmental remediation. The type of contamination in the water mirror of the bay of Santiago de Cuba was characterized, using physical-chemical analysis methods, UV-VIS spectrophotometry and surface tension, from the surface to one meter deep, at four sampling points: "Hermanos Díaz" Oil Refinery (P 1), "Antonio Maceo" Thermoelectric Power Plant (P 2), "Guillermón Moncada" Port (P 3) and La Estrella Beach (P 4).

# STUDY OF THE HYDROTHERMAL MODIFICATION OF AN IGNIMBRITIC MINERAL TO OBTAIN SYNTHETIC ZEOLITE OF HIGH CAPACITY OF CATIONIC EXCHANGE

## ESTUDIO DE LA MODIFICACIÓN HIDROTHERMAL DE UN MINERAL IGNIMBRÍTICO PARA OBTENER ZEOLITA SINTÉTICA DE ALTA CAPACIDAD DE INTERCAMBIO CATIONICO

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Paul K. Huanca Z.<sup>1,\*</sup>, Lenni T. Corrales F.<sup>2</sup>, Betty Paredes<sup>3</sup>, Jonathan J. Almirón B.<sup>4</sup>  
Derlis P. Gonzales S.<sup>5</sup>

<sup>1</sup>Escuela Profesional de Ingeniería de Materiales, Facultad de Ingeniería de Procesos FIP, Universidad Nacional San Agustín de Arequipa UNSA, Av. Independencia s/n-Pab. Ing. Materiales, phone +5154200037, Arequipa, Perú, materiales@unsa.edu.pe, <http://fip.unsa.edu.pe/ingmateriales/>

<sup>2</sup>Escuela de Posgrado de la Universidad Nacional San Agustín de Arequipa UNSA, Calle San Agustín 108-Cercado Arequipa phone +5154229864, Arequipa, Perú, posgrado\_imformes@unsa.edu.pe, <http://posgrado.unsa.edu.pe/ingmetalurgica/>

<sup>3</sup>Escuela Profesional de Química, Facultad de Ciencias Naturales y Formales FCNF, Universidad Nacional San Agustín de Arequipa UNSA, Av. Venezuela s/n, phone +5154404197, Arequipa, Perú, quimica@unsa.edu.pe, <http://fip.unsa.edu.pe/quimica/>

<sup>4</sup>Escuela Profesional de Ingeniería Ambiental, Facultad de Ingeniería de Procesos FIP, Universidad Nacional San Agustín de Arequipa UNSA, Av. Independencia s/n-Pab. Antonio Raimondi-4to piso, Área de Ingenierías, phone +5154201723, Arequipa, Perú, ambiental@unsa.edu.pe, <http://fip.unsa.edu.pe/ingambiental/>

<sup>5</sup>Escuela Profesional de Ingeniería de Materiales, Facultad de Ingeniería de Procesos FIP, Universidad Nacional San Agustín de Arequipa UNSA, Av. Independencia s/n-Pab. Ing. Materiales, phone +5154200037, Arequipa, Perú, materiales@unsa.edu.pe, <http://fip.unsa.edu.pe/ingmateriales/>

**Keywords:** Synthetic zeolite, NaP1, Ignimbrite.

**Palabras clave:** Zeolita sintética, NaP1, Ignimbrita.

### ABSTRACT

This research led to the establishment of a methodology for the morphological characterization of an ignimbritic mineral. The material was collected in the area of Uchumayo, Peru. The samples were analyzed by scanning electron microscopy (SEM). The synthetic zeolite type NaP1 was obtained by hydrothermal activation in an alkaline medium of NaOH from ignimbrite. The morphology of the mineral was determined before and after the activation process. In addition, the cation exchange capacity of the material by method 9081 (cation exchange capacity of residues) was determined by atomic absorption spectroscopy. It is concluded that from the ignimbrite mineral, synthetic zeolite type NaP1 was obtained. On the other hand, a high cation exchange capacity was manifested, thus defining an important alternative for the region in the remediation and mitigation of heavy metal pollution in industrial effluents through ion exchange processes.

\*Corresponding author: [phuanca@unsa.edu.pe](mailto:phuanca@unsa.edu.pe)

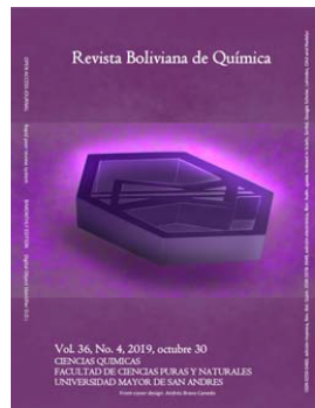
**CHEMOMETRIC EVALUATION OF  
THE INTERNAL REFERENCE  
MATERIAL (IRM) OF AGRICULTURAL  
SOILS IN TWO PROVINCIAL  
MUNICIPALITIES OF LA PAZ**

**EVALUACIÓN QUIMIOMÉTRICA  
DEL MATERIAL DE REFERENCIA  
INTERNO (MRI) DE SUELOS  
AGRÍCOLAS EN DOS MUNICIPIOS  
PROVINCIALES DE LA PAZ**

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Rolando Mamani Quispe<sup>1</sup>, Leonardo Guzmán Alegria<sup>1</sup>, Jorge Chungara Castro<sup>2</sup>,  
Oswaldo E. Ramos Ramos<sup>1</sup>

<sup>1</sup>Instituto de Investigaciones Químicas (IIQ), Carrera de Ciencias Químicas, Facultad de Ciencias Puras y Naturales FCPN, Universidad Mayor de San Andrés UMSA, P.O. Box 303, Calle Andrés Bello s/n, Ciudad Universitaria Cota Cota, Phone +59122795878, La Paz, Bolivia, [www.umsa.bo](http://www.umsa.bo)

<sup>2</sup>Agencia Boliviana de Energía Nuclear ABEN, Centro de Investigación y Aplicaciones Nucleares CIAN, Calle Jaime Mendoza Nro. 987, Esq. Peñaranda, Edificio Torre Soleil (Calacoto), Phone 59122127178, fax 59122129754, <http://www.aben.gob.bo/es/contacto>, [comunicacion@aben.gob.bo](mailto:comunicacion@aben.gob.bo)

**Keywords:** *Agricultural soils, Natural fertility, Homogeneity, Repeatability, Stability.*

**Palabras clave:** *Suelos agrícolas, Fertilidad natural, Homogeneidad, Repetibilidad, Estabilidad.*

**ABSTRACT**

The purpose of the present work is to prepare, characterize and evaluate the physicochemical parameters of two soil samples to be used as internal reference material (MRI). The samples were collected in Yamora (Municipality of Inquisivi) and Viacha (Municipality of Viacha), dried at 100°C, ground, homogenized and quartered. The characterization was carried out by volumetry, potentiometry, conductimetry, UV-Visible spectrophotometry and Atomic Absorption spectrometry.

According to the physical-chemical analysis, the soil of Yamora has a fertility suitable for all types of crops because it has a neutral pH, and high contents in P, % N, % MO and low CE. While the Viacha soil has a low natural fertility due to the strongly alkaline pH, high Na + contents and low P, % N and % MO contents.

The tests and statistical evaluation of the internal reference materials MRI A (Yamora) and MRI B (Viacha) show homogeneity in all the parameters considered, except the pH in water. Regarding stability, it was subjected to an evaluation of phosphorus stability assimilable over time and according to statistical results it was shown that the

stability of MRI B is high, however MRI A is slightly unstable. According to the results, the internal reference materials MRI A (Yamora) and MRI B (Viacha) meet the basic internal reference material requirements for the types of soil studied.