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**OBTAINING OF SYNTHETIC ZEOLITE
TYPE NaP1 IN ALKALINE MEDIUM
FROM NATURAL ZEOLITE UNDER
LABORATORY CONDITIONS**

**OBTECIÓN DE ZEOLITA SINTÉTICA
TIPO NaP1 EN MEDIO ALCALINO A
PARTIR DE ZEOLITA NATURAL EN
CONDICIONES DE LABORATORIO**

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Full original article

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Keywords: Synthetic zeolite, Natural zeolite, NaP1.

ABSTRACT

This research conducted to the establishment of a methodology for the morphological characterization of natural zeolite. The material was collected at the area of Lampu, Peru. The samples were analyzed by electron microscopy scanning (SEM). Synthetic zeolite type NaP1 was obtained by activation in a NaOH alkaline medium out of natural

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zeolite. Morphology of the ore was determined before and after the activation process. Also, the ability of cationic exchange of the zeolite material by the method 9081 (capacity of cationic exchange of waste) was determined by atomic absorption spectroscopy. The characterization of the material studied in terms of morphology before and after the activation process, and determination of the cationic exchange of the resulting material were achieved. It is concluded that natural zeolite was heulandite, from which synthetic zeolite type NaP1 was obtained. On the other hand, high capacity of cationic exchange was manifested defining thus an important alternative for the region in remediation and mitigation of pollution by heavy metals in industrial effluents through ion exchange processes.

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**SYNTHESIS AND EVALUATION OF
COMPOSITE MATERIAL SnS₂/GO
AND ITS APPLICATION AS
PHOTOCATALYST OF CYANIDE IONS**

**SINTESIS Y EVALUACION DE
MATERIALES COMPUESTOS DE
SnS₂/GO PARA SU APLICACIÓN
COMO FOTOCATALIZADORES DE
IONES CIANURO**

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Keywords: *Grafene oxide, Hydrothermal/atrane method, Stannatranne complexes.*

ABSTRACT

Lamellar graphene oxide (GO) was obtained by the modified Hummers method with an average size of $9 \pm 3 \mu\text{m}$ and tin sulphide (SnS₂) with different sizes between $60 \pm 20 \text{ nm}$ and $375 \pm 50 \text{ nm}$ by the innovative method hydrothermal/atrane. Based on these methods, a SnS₂/GO composite was synthesized. This product has been evaluated as a photocatalyst for degradation of CN⁻ ions under standardized conditions with visible electromagnetic radiation. The degradation capacity of the materials obtained are presented in the order SnS₂/GO > SnS₂ > GO.

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**TITANIUM-OXO-HYDROXO-
ATRANE CLUSTER (TOHAC);
NUCLEATION IN
AQUEOUS SYSTEM**

**TOHAC (TITANIO-OXO-
HIDROXO-ATRANO CLUSTER);
NUCLEACIÓN EN
SISTEMA ACUOSO**

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Keywords: *Tohac, Nucleation, Aqueous system.*

ABSTRACT

The molar ratio $h = [\text{H}_2\text{O}] / [\text{Titanatrane}]$ (Titanatrane = $\text{N}(\text{CH}_2\text{CH}_2\text{O})_3\text{Ti} - \text{Z}$ with $\text{Z} = -\text{TEAH}_2, -\text{OR}, -\text{OH}$) ($h = 556, 278$ and 139) and temperature ($T = 30, 50$ and 70 °C) has been evaluated in the kinetics of formation of Titanium Oxo - Hydroxo - Atrane Clusters (TOHAC) in aqueous solution. The formation of the TOHAC was monitored by UV-Vis absorption, at a predefined wavelength of $\lambda = 450$ nm. The induction time and formation ratio of the "TOHAC" have been identified. The kinetic parameter (α) and the apparent activation energy (E_a) was calculated. We defined a new formation mechanism for TOHAC confirming the role of TEAH_2 as a retardant agent of hydrolysis and condensation.

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