



Revista Boliviana de Química

Rev. Bol. Quim. ISSN 0250-5460
Rev. boliv. quim. ISSN 2078-3949

Bolivian Journal of Chemistry
Vol. 39, No. 3, 2022

Abstracts

OPEN ACCESS JOURNAL
Rapid peer review system
BIMONTHLY EDITION
Digital Object Identifier D.O.I.

Revista Boliviana de Química

Vol. 39, No. 3, 2022, agosto 30, publicación del
INSTITUTO DE INVESTIGACIONES QUÍMICAS, IIQ, CCQ
FACULTAD DE CIENCIAS PURAS Y NATURALES
UNIVERSIDAD MAYOR DE SAN ANDRÉS

ISSN 0250-5460, edición impresa; Rev. Bol. Quim. ISSN 2078-3949, edición electrónica; Rev. boliv. quim. indexed in Scielo, Scirbd, Google Scholar, Latinindex, OAJI and Redalyc

Front-cover design: Andrés Bravo Canedo



1

REVISTA BOLIVIANA DE QUÍMICA
ISSN 0250-5460 Rev. Bol. Quim. Paper edition
ISSN 2078-3949 Rev. boliv. quim. Electronic edition
Naviana Leiva et al. RBQ Vol.39, No.3, pp. 56-69, 2022

Received 04 08 2022 39(3); Jul./Aug. 2022
Accepted 08 18 2022
Published 08 30 2022; DOI:10.34098/2078-3949.39.3.1



SÍNTESIS DE COMPUESTOS $\text{LiTi}_2(\text{PO}_4)_3$ TIPO NASICON CON SILICIO Y BORO PARA SU EVALUACIÓN COMO ELECTROLITO SÓLIDO

Received 04 08 2022
Accepted 08 18 2022
Published 08 30 2022

Vol. 39, No.3, pp. 56-69, Jul./Aug. 2022
Revista Boliviana de Química

39(3), 56-69, Jul./Aug. 2022
Bolivian Journal of Chemistry
DOI: 10.34098/2078-3949.39.3.1



Full original article

Peer-reviewed

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ABSTRACT

Compounds with a NaSICON (Sodium Superionic Conductor) type structure $\text{LiTi}_2(\text{PO}_4)_3$ with silicon and boron in their structure have been synthesized by solid-state reactions. The composition stoichiometry is $\text{Li}_4\text{Ti}_2\text{P}_3\text{SiB}_3\text{O}$ with a glass-ceramic type structure. It was possible to maintain and optimize the majority formation of the ion-conducting crystalline phase by regulation of TiO_2 and H_3PO_4 at synthesis temperatures below 1000°C . This was achieved by rigorous temperature control during slow cooling to obtain the phase of interest, considering boron as flux and network former, at temperatures of 600°C , 700°C and 800°C . These phases have been structurally and microstructurally characterized by X-ray powder diffraction (XRD) and scanning electron microscopy (SEM). Structural analysis using the Rietveld method and Fourier maps show that the final compound crystallizes with a NaSICON-type Rhombohedral structure. Additionally, the computational calculation of the thermodynamic properties has been carried out to obtain the $\text{LiTi}_2(\text{PO}_4)_3$ and LiTiOPO_4 phases by DFT for the prediction of the synthesis temperature, obtaining a theoretical value of 695°C that were compared with the experimental results of 700°C .

Palabras clave: *Electrolito sólido, quenching, NaSICON, Refinamiento Rietveld.*

ABSTRACT

Compounds with a NaSICON (Sodium Superionic Conductor) type structure $\text{LiTi}_2(\text{PO}_4)_3$ with silicon and boron in their structure have been synthesized by solid-state reactions. The composition stoichiometry is $\text{Li}_4\text{Ti}_2\text{P}_3\text{SiB}_3\text{O}$ with a glass-ceramic type structure. It was possible to maintain and optimize the majority formation of the ion-conducting crystalline phase by regulation of TiO_2 and H_3PO_4 at synthesis temperatures below 1000°C . This was achieved by rigorous temperature control during slow cooling to obtain the phase of interest, considering boron as flux and network former, at temperatures of 600°C , 700°C and 800°C . These phases have been structurally and



2



**SYNTHESIS OF SILICOALUMINATE
MESOPOROUS SUPPORT BY THE
ATRANO ROUTE, MORPHOLOGICAL
AND ACIDITY PROPERTIES OF THE
MESOCELLULAR FOAM, MCF, FOR
COBALT CATALYSTS DESIGN**

Received 05 26 2022
Accepted 08 20 2022
Published 08 30 2022

Vol. 39, No. 3, pp. 70-85, Jul./Aug.2022
Revista Boliviana de Química

39(3), 70-85, Jul./Aug. 2022
Bolivian Journal of Chemistry
DOI: 10.34098/2078-3949.39.3.2



Full original article

Peer-reviewed

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Keywords: Mesoporous, Silicoaluminate, Mesocellular foam, Catalyst support

Palabras clave: Mesoporoso, Silicoaluminato, Mesocelular, Espuma, Soporte de catalizador

ABSTRACT

The synthesis of silicoalumina mesoporous supports was carried out by the atrano route. The supports obtained showed high homogeneity in the aluminum dispersion, a large surface area and a narrow pore size distribution. The synthesized mesoporous mesocellular foam (MCF) supports contain 5%, 10% and 15% Al₂O₃ in the SiO₂ matrix. 12% cobalt was added to these mesostructured supports by the incipient wetness impregnation method. These materials were characterized by Nitrogen adsorption (BET-BJH), Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD), Temperature Programmed Reduction of H₂ (TPR), and Temperature Programmed Desorption of NH₃. (TPD). According to the structural properties of these catalysts, a promising application in Fischer-Tropsch (FTS) syntheses is identified..



**ANTIOXIDANT CAPACITY
ASSESSMENT BY ABTS OF
9'Z-BIXIN, 9'Z-NORBIXIN, 9'Z-
METHYLBIXIN AND ALL E-
METHYLBIXIN FROM
BIXA ORELLANA SEEDS**

Received 08 23 2022
Accepted 08 29 2022
Published 08 30 2022

Vol. 39, No.3, pp. 86-93, Jul./Aug.2022
Revista Boliviana de Química

39(3), 86-93, Jul./Aug. 2022
Bolivian Journal of Chemistry
DOI: 10.34098/2078-3949.38.3.3



Full original article

Peer-reviewed

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ABSTRACT

The 9'Z-bixin is the major pigment present in the annatto (*Bixa orellana L.*) seeds. Other carotenoids present in the seeds of annatto are 9'Z-norbixin and 9'Z-methylbixin. Annatto seeds extract is used as a food colorant. In this study, we extracted and isolated 9'Z-bixin from annatto seeds. 9'Z-norbixin was obtained and purified by saponification of annatto seeds extract. Then, 9'Z-methylbixin was obtained by Steglich esterification of 9'Z-bixin with EDC/DMAP. Also, all E-methylbixin was obtained by esterification of 9'Z-bixin in acid conditions with hydrochloric acid in methanol. The antioxidant capacity of 9'Z-bixin and bixin derivatives was measured in ABTS assay to determine their structure-activity relationship. We observed that the esterification of 9'Z-bixin decreases its antioxidant capacity and that the presence of the free carboxyl group is important in the antioxidant capacity of bixin derivatives.