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Marcelo Rodríguez Valdivia et al. RBQ Vol.38, No.4, pp. 133-147, 2021

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APLICACIÓN DE UN DISEÑO EXPERIMENTAL EN LA SÍNTESIS HIDROTHERMAL DE ZEOLITA Gis-NaP A PARTIR DE RESIDUOS DE LADRILLO

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Full original article

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Keywords: Brick waste, Cation exchange capacity, Gis-NaP zeolite, Factorial experimental design, Hydrothermal synthesis.

Palabras clave: Residuos de ladrillo, Capacidad de intercambio catiónico, Zeolita Gis-NaP, Diseño experimental factorial, Síntesis hidrotermal.

ABSTRACT

This article reports the results of an investigation carried out to obtain a zeolitic material of the Gis-NaP type with a high capacity to exchange cations using brick waste. The hydrothermal synthesis was carried out in a stainless steel reactor using activating NaOH solutions at concentrations of 2.0, 2.5 and 3.0 M, activation temperatures of 100, 120 and 140°C and activation times of 7, 8 and 9 hours. The product obtained was characterized by X-ray Fluorescence, Scanning Electron Microscopy (SEM), X-ray Diffraction and cation exchange capacity (CEC).

The obtained results showed that the hydrothermal synthesis at the condition of 140°C/2M/7hours, zeolite Gis-NaP with a cation exchange capacity equal to 163.5 meq/100g is obtained. The statistical analysis applying a factorial experimental design, indicated that the main factors with a great effect on the cation exchange capacity (CEC) are the activation temperature and the interaction between it and the concentration of the activating solution, with a degree of significance of 0.049250 and 0.056631 for a confidence level of 90.82%. An empirical and validated mathematical model was developed by applying the ANOVA analysis that considers the interaction effects of all the factors and it was optimized by applying the response surface methodology.



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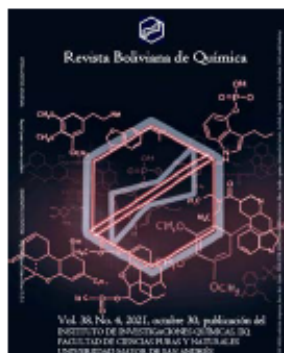


CELLULASE PRODUCTION BY MICROORGANISMS ISOLATED FROM LAGUNA BLANCA, POTOSÍ-BOLIVIA

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Verushka Camacho, Roberto Soto, Héctor Guzmán, Virginia A. Vargas*

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Keywords: Cellulases, Forest products, Agro-industrial waste, Banana peel

Palabras clave: Celulasas, Productos forestales, Residuos agroindustriales, Cáscara de banana

ABSTRACT

Bacterial strains isolated from water samples collected from Laguna Blanca, Potosi-Bolivia and deposited at Biotechnology Center, Cochabamba-Bolivia, were subjected to cellulase enzyme production studies. Among 71 strains, 32 were selected as positive in liquid medium using filter paper as sole carbon source. Nine strains reported higher cellulase activity and the effect of NaCl concentration and pH on microorganism growth was evaluated. Thus, 7 strains were identified as halophiles meanwhile 2 were halotolerant. According to the medium pH value, 5 strains were neutrophiles and 4 alkalotolerants. Strains coded as LB-4 and LB-8 were selected as the best enzyme producers. Furthermore, cellulase production using forest products and agro-industrial residues were positive for different types of paper and pine wood. Nevertheless, higher activity values were detected using banana peel and sugarcane bagasse. The strain LB-8 was selected as the best cellulase producer under the conditions used in this study with 2.774 U/ml enzyme activity. Phylogenetic analyses showed 99.99 % sequence similarity between strain LB-8 and *Bacillus pumilus*.



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REMOVAL OF 2-NITROPHENOL, 2,4-DINITROPHENOL AND 2,4,6- TRINITROPHENOL FROM AQUEOUS SOLUTION THROUGH ADSORPTION ON COBALT, NICKEL AND TUNGSTEN FERROCYANIDES

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Keywords: Removal, 2-Nitrophenol, 2,4-Dinitrophenol, 2,4,6-Trinitrophenol, Adsorption, Metal ferrocyanides.

Palabras clave: Eliminación, 2-Nitrofenol, 2,4-Dinitrofenol, 2,4,6-Trinitrofenol, Adsorción, Ferrocianuros metálicos.

ABSTRACT

Cobalt, nickel and tungsten ferrocyanides were synthesized and characterized by elemental and spectral studies. Removal of 2-nitrophenol, 2, 4-dinitrophenol and 2,4, 6-trinitrophenol from aqueous solution through adsorption on synthesized metal ferrocyanides were studied in the pH range 1.0 – 10.0 and at a temperature of $30 \pm 1^\circ \text{C}$. The Langmuir type of adsorption is followed in the concentration range of 10^{-3} M to 10^{-4} M for 2-nitrophenol, 2,4-dinitrophenol and 2,4,6-trinitrophenol solutions. The 2,4,6-trinitrophenol and 2-nitrophenol were found to have maximum and minimum affinity with all three metal ferrocyanides studied. Nickel and tungsten ferrocyanides were found to have higher and lower adsorption capacity with all three substituted phenols.



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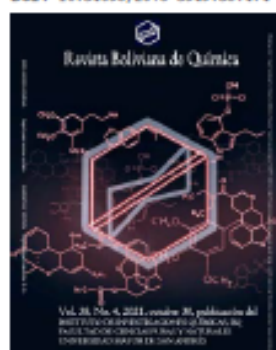


EFFECTO DE LA TEMPERATURA
SOBRE LAS PROPIEDADES
ACÚSTICAS Y VOLUMÉTRICAS DE
MEZCLAS BINARIAS LÍQUIDAS DE
PROPANONITRILLO Y PROPANOATO
DE METILO, Y DE PROPANONITRILLO
Y PROPANOATO DE ETILO

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Keywords: Propanonitrilo, Methyl propanoate, Ethyl propanoate, Excess molar volumen, Excess Isoentropic compressibility, Speed of sound, Thermal expansion coefficient.

Palabras clave: Propanonitrilo, Propanoato de metilo, Propanoato de etilo, Exceso de volumen molar, Exceso de compresibilidad Isoentrópica, Velocidad del sonido, Coeficiente de expansión térmica.

ABSTRACT

The densities (ρ) and speeds of sound (u) of binary liquid mixtures formed by propanonitrile + methyl propanoate and propanonitrile + ethyl propanoate, including those of the pure liquids, at a temperature range from 278.15 K to 318.15 K every 5 K are reported in this paper. The density and speed of sound were measured over the complete composition range at the atmospheric pressure. The experimental data were used to calculate the molar volume $V(x, T)$, excess molar volume $V^E(x, T)$, the deviation in speed of sound $\Delta u(x, T)$, the isoentropic compressibility $K_S(x, T)$, the excess isoentropic compressibility $K_S^E(x, T)$, the thermal expansion coefficient $\alpha(x, T)$ and the excess thermal expansion coefficient $\alpha^E(x, T)$. Every set of results of the properties of the excess was fitted to a polynomial equation like the Redlich-Kister equation [1], the deviations obtained were of the order of experimental error. The excess values of the mixtures studied were negative for the entire composition range and all temperatures. The results have been discussed in terms of molecular interactions and structural effects. The models proposed by Nomoto [2,3], Van Dael [4] y Ernst et al. [5] were used to calculate the speed of sound at 298.15 K.