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CARACTERIZACIÓN MECÁNICA Y MICROESTRUCTURAL DE UN ACERO INOXIDABLE AISI:304 ENDURECIDO MEDIANTE NITRURACIÓN USANDO RESIDUOS DE MELAMINA

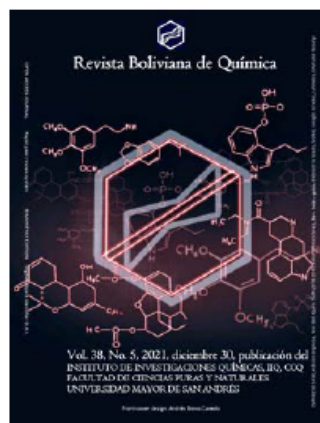
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Full original article

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Keywords: Melamine, diffusion, nitriding, factorial experimental design, stainless steel AISI:304, surface hardness

Palabras clave: Melamina, difusión, nitruración, diseño experimental factorial, acero inoxidable AISI:304, dureza superficial

ABSTRACT

This article presents the results obtained from the nitriding of an AISI: 304 stainless steel, subjected to a solid nitriding process recycling melanin residues; due to its chemical composition it constitutes a suitable material for supplying nitrogen gases. The micrographs showed that the nitriding process causes important structural changes with the formation of Fe nitrides (γ -Fe₄N and ϵ -Fe₂N), which substantially increase the surface hardness. Tests at 550°C/4 hours, 580°C /4 hours and 565°C /3 hours, showed surface hardness of 30.17, 30.0 and 29.9 HRC; representing an increase of 67% when compared to steel in supply condition. Statistical analysis applying a factorial experimental design indicated that the main factors that influence hardness are: nitriding time and its interaction with temperature with a significance of 0.0094 and 0.0707 for a confidence level of 90%. The thickness of the hardened layer is directly dependent on the concentration and diffusion rate of N atoms that enter the steel from its surface and move towards the interior.



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OPTIMIZACIÓN DEL MÉTODO DE DIGESTIÓN ÁCIDA EN SISTEMA DE MICROONDAS PARA LA DETERMINACIÓN DE CONCENTRACIONES PSEUDO-TOTALES DE Fe, Mn Y Zn EN SEDIMENTOS DE LA CUENCA KATARI BAJO, LA PAZ, BOLIVIA

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Keywords: Trace Elements, Microwave System, Acid digestion, Sediments

Palabras clave: Elementos Traza, Microondas, Digestión ácida, Sedimentos

ABSTRACT

The sediments are considered reservoirs of trace elements where these are transported by river water and deposited in the lower part of the basin. The work presents the optimization of an acid digestion method in a microwave system to determine trace elements like Fe, Mn and Zn in sediments at three depths, PK9-1 (0-0.5 m), PK9-2 (0.5-2 m) and PK9-3 (2-2.7 m) in a randomly selected piezometer from a total of 17 piezometers. In addition, certified reference materials as the MRC MESS-3 for sediments and the MRC C17-2 for soils have been used for a quality control of the acid digestion method. For the quantification, the Flame Atomic Absorption Spectrometry (FAAS) technique has been used and for the statistical interpretation of the data, a 2x2 factorial design (ANOVA) was applied. The extraction procedures involve volume variations of 3:3 and 3:1 mL of HNO₃:HCl, a power of 300/600 W and 100/300/700 W and with/without the use of H₂O₂. The result of the MRC MESS-3 shows that varying the extraction conditions does not considerably affect the concentrations of Fe, Mn and Zn, where the most optimal procedure is 3 hours, without H₂O₂ and with 3:1 mL HNO₃/HCl with a minimum significant difference between the experimental and the reference values. The results using the MRC C17-2 show errors that exceed 10% where there are significant differences between the experimental and reference value for Zn and Mn. On the other hand, PK9-1 (0-0.5) m and PK9-3 (0.5-2) m show P > 0.05 for Fe, indicating a significant difference in the average concentrations, and P < 0.05 for Zn/Mn indicating that there are no significant differences in the average concentrations when varying the volume and power conditions. Likewise, PK9-2 (0.5-2) m shows P > 0.05 for Zn/Fe, indicating a significant difference in the average concentrations when varying the conditions of volume, power and with/without the use of H₂O₂. For Mg, a P < 0.05 indicates that there is no significant difference in the average concentrations. Therefore, varying amounts of volume, power and H₂O₂ do not considerably alter the trace elements concentrations and therefore the trace elements concentrations vary with depth according to the lithological characteristics of the sediments.



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TRATAMIENTO DE EFLUENTE PETROLERO MEDIANTE OXIDACIÓN NO FOTOQUÍMICA Y FOTOQUÍMICA SOLAR, EMPLEANDO LODOS ROJOS COMO CATALIZADOR

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Keywords: *Advanced oxidation processes, red sludge, Fenton-like, photoFenton-like, photocatalysis, sour waters, design of experiments.*

Palabras clave: *Procesos de oxidación avanzada, lodos rojos, Fenton-like, fotoFenton-like, fotocatalísis, aguas agrias, Diseño de Experimentos.*

ABSTRACT

In this research, the degradation of petroleum wastewater originated from the process of experimental improvement of heavy and extra-heavy crude oil was studied, through advanced oxidation processes (AOP). The sour water sample was characterized by measuring the pH, conductivity, turbidity and Chemical Oxygen Demand (COD) using the HACH DR2010 method; The concentration of Total Petroleum Hydrocarbons (TPH) was determined through the ultraviolet fluorescence (UVF) technique Sitalab: EDRO: 16. The chloride concentration was determined according to Standard Methods 4500 (1995). Induced Plasma Mass Spectroscopy (ICP-MS) was applied for the determination of metals and the concentration of sulfides by means of the ASTM D4658-03 standard. Identification of organic species was performed by mass coupled gas chromatography (GC-MS). Non-photochemical (Fenton-like) and solar photochemical (photoFenton-like and solar photocatalysis) reactions were applied with a 2² factorial experiment design with a replica. The treated water was evaluated for its pH, conductivity, COD, TPH and the remaining concentration of hydrogen peroxide. The identification of the ions generated was carried out by means of an Ion Chromatograph (IC). In the non-photochemical reaction, a reduction in COD was obtained by 83.42% and in TPH by 99.92%. For the solar photochemical process, a reduction of 91.16% for COD and 100% for TPH was obtained. The conversion of sulfide to sulfate in the first technique was 44.73% and the second was 99.99%. There was greater organic oxidation in the solar photochemical reaction, obtaining carbonyls and short-chain carboxylic acids.



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ESTUDIO BROMATOLÓGICO DEL FRUTO Y PALMA DE LA ESPECIE ARBÓREA *EUTERPE PRECATORIA*, PALMERA DE ASAÍ, IXIAMAS, DEPARTAMENTO DE LA PAZ, BOLIVIA

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Keywords: Palm, Asaí, *Euterpe precatoria*, palm heart, Bromatological, Antioxidants, Bolivia

Palabras clave: Palmeras, Asaí, *Euterpe precatoria*, Palmito, Bromatológico, Antioxidantes, Bolivia

ABSTRACT

The study of the nutritional content of the edible parts (fruit and hearts of palm) of the tree species *Euterpe precatoria* (*Arecaceae*) or Asaí Palm was carried out. The analyses demonstrated the high nutritional value of the species. The samples were collected in the town of Ixiamas and its surroundings (North of the Department of La Paz). The energy content of the fruit is approximately 515.4 kcal and of the palm heart ranges between 349.7 - 361.8 kcal. The protein content of the fruit and of the palm heart ranges between 8.4 - 8.8% and 21.4- 35.5% respectively. The Asaí fruit has a high content of Vitamin A, of: 442.47 ug / 100g. Palmito and fruit have high content of calcium, magnesium and potassium. It is important to note that an important antioxidant capacity was also determined in the Asaí samples.