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Cada edición muestra los trabajos que derivan del arbitraje académico estricto de carácter internacional. También se publican números especiales de temas particulares que fueron presentados en los diversos Congresos Interamericanos realizados por la Asociación Interamericana de Ingeniería Sanitaria y Ambiental (AIDIS) y que en forma adicional fueron sometidos al proceso de revisión interno de la revista.

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EFEITO DO LEITO FILTRANTE E DA DOSAGEM DE CLORO NA FORMAÇÃO DE TRIHALOMETANOS EM ÁGUA DE ABASTECIMENTO APÓS TRATAMENTO COMBINADO POR DUPLA FILTRAÇÃO E DESINFECÇÃO

Yuri Pereira Barbosa¹
* Francisco Mauricio de Sá Barreto¹
Waleska Martins Eloi¹
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Raissa Braga da Costa¹

EFFECT OF FILTER BED AND CHLORINE DOSAGE ON THE FORMATION OF TRIHALOMETHANES IN WATER SUPPLY AFTER COMBINED TREATMENT BY DOUBLE FILTRATION AND DISINFECTION

Recibido el 23 de abril de 2024. Aceptado el 22 de abril de 2025

Abstract

The Water Treatment Plants (WTPs) are designed based on the quality of the source water, which determines the most appropriate technology to be used in the treatment process to ensure potable water. In Fortaleza, Ceará, Brazil, the Gavião WTP is the main supplier for the capital and its metropolitan region, employing direct downward filtration technology, which has certain limitations. This study evaluated the effect of double filtration using different filter media and varying chlorine dosages on the formation of trihalomethanes (THMs), which are disinfection by-products, in water intended for public supply. The study was conducted in two filtration cycles, each performed under different climatic conditions. Raw water was filtered through sand beds (upflow and downflow) during the rainy season, from February to March 2023, and through sand and anthracite beds (upflow and downflow) during the dry season, in October and November 2022. The samples were characterized by apparent color, pH, temperature, turbidity, and total organic carbon, while THM levels were determined only in chlorinated samples. The results indicated that the lowest concentrations of THMs were observed after filtration through sand and anthracite beds during the rainy season, and that double filtration in both filter media was effective in maintaining water quality within the standards required by Brazilian regulations, demonstrating the efficiency of the treatment processes employed.

Keywords: disinfection by-products, water quality, treatment processes.

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PEQUENA DIMENSÃO, GRANDE IMPACTO: UMA ANÁLISE SOBRE A POLUIÇÃO POR MICROPLÁSTICO

* Emily Giacobbo¹
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Guilherme Gavlak¹

SMALL SIZE, BIG IMPACT: AN ANALYSIS OF MICROPLASTIC POLLUTION

Recibido el 14 de mayo de 2024. Aceptado el 18 de marzo de 2024

Abstract

Microplastic pollution is a growing concern due to its diverse origins and widespread impacts on ecosystems and human health. Mainly originating from the degradation of larger plastics, these residues contaminate both aquatic and terrestrial environments. In water bodies, they are easily ingested by aquatic organisms, disrupting life cycles and food chains. In soil, their presence can affect quality and biodiversity, while in the air, they remain suspended and can be transported by wind. The impacts of microplastics are worrisome, particularly due to their ability to bioaccumulate in marine and terrestrial organisms, including humans. This pollution poses a significant challenge, necessitating detailed study through research where microplastics are the focus, along with the impact this pollutant presents in various scenarios. Thus, this study presents the results of a comprehensive literature review on the topic, highlighting key findings and linking the presence of these tiny residues to water, soil, and air contamination, as well as alterations in the food chain and consequently, in humans. It can be concluded that this type of pollution, present in all possible forms of human contamination, is already a reality due to its presence in aquatic environments, primarily affecting the food chain. Furthermore, these studied pollutants are smaller than those visible to the naked eye and are identified as fibers and filaments, often in predominant blue, red, and white colorations.

Keywords: contamination, ecosystems, microplastics, plastic.

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TRATAMIENTO DE ÁGUA RESIDUÁRIA DE LATICÍNIO EM FILTRO ANAERÓBIO COM BIOMASSA IMOBILIZADA DE FLUXO DESCENDENTE OPERADO EM BATELADA ALIMENTADA

Giglieli Gislon¹
Fatima de Lourdes Collar Silva¹
* Maria Magdalena Ribas Döll²

TREATMENT OF DAIRY WASTEWATER IN A DOWN-FLOW ANAEROBIC FILTER WITH IMMOBILIZED BIOMASS OPERATED IN FED-BATCH

Recibido el 5 de octubre de 2024. Aceptado el 22 de abril de 2025

Abstract

This paper aim was to analyze the down-flow anaerobic filter performance operated in fed-batch with immobilized biomass in pilot scale in the treatment of dairy effluent. The filter was built using PVC with useful volume of 90 L. The reactor was filled with three layers: stone gravel, mixing of blast-furnace slag and limestone and rolled pebble. The filter was operated during 147 days with increasing organic volumetric loading rate (OLR) from 1.4 to 9.6g COD L⁻¹ d⁻¹. The removal efficiency of chemical oxygen demand (COD) maximum was 60% after 65 days of operation with COD of 4.4g CODL⁻¹ d⁻¹ and 59% after 110 days with COD of 7.1 g COD L⁻¹ d⁻¹. The pH remained between 6.5 and 7.3 and the electrical conductivity between 6.6 and 9.5 mS cm⁻¹. There was generation of bicarbonate alkalinity from 1647 mgHCO₃⁻ L⁻¹ and total volatile acidity at the bottom had an average value of 626.3 mgHAc L⁻¹. The Total Solids, Total Fixed Solids and Total Volatile Solids had an average efficiency removal from 79%, 20% and 89%, respectively. The maximum biogas production was 55.95 L d⁻¹ at STP.

Keywords: anaerobic digestion, biofilm, discontinuous, industrial effluent, milk.

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ESTIMATIVA DO CONSUMO RESIDENCIAL DE ÁGUA, ENERGIA ELÉTRICA E GERAÇÃO DE RESÍDUOS SÓLIDOS PARA O MUNICÍPIO DE BELO HORIZONTE, MINAS GERAIS, BRASIL, POR MEIO DE MODELOS EXISTENTES

* Ana Luiza Cordeiro ¹
David Montero Dias ²
Eduardo Coutinho de Paula ¹

ESTIMATION OF RESIDENTIAL CONSUMPTION OF WATER, ELECTRIC POWER AND GENERATION OF SOLID WASTE FOR THE MUNICIPALITY OF BELO HORIZONTE, MINAS GERAIS, BRAZIL, USING EXISTING MODELS

Recibido el 24 de octubre de 2024. Aceptado el 22 de abril de 2025

Abstract

Previous studies have verified the relationship between economic issues and water and energy consumption and the generation of solid waste. Estimating these parameters can help in formulating public policies, making decisions regarding environmental protection, etc. Thus, the objectives of this study were: i) correlational socioeconomic aspects of the population sampled in Belo Horizonte, Minas Gerais, Brazil, and their domestic consumption of water and electricity, as well as generation of solid waste through models developed in studies previous; ii) make a comparison with current real data presented by the bodies responsible for the management and handling of water, energy and solid waste. It was found that the models need to be recalibrated. However, per capita estimates of water consumption and solid waste generation presented values associated with those recorded by the responsible bodies, in all economic classes evaluated. Although it has been verified that the model needs recalibration, the present study is the first step towards resuming work with this approach. The use of studied models would facilitate analysis and decision-making in the provision of services related to water and energy consumption, as well as the generation of solid waste.

Keywords: *water consumption, electricity consumption, solid waste generation, per capita income, model evaluation.*

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CODIGESTÃO ANAERÓBIA DE EFLUENTES AGROINDUSTRIAIS: AVALIAÇÃO E MODELAGEM DE DESEMPENHO

Larissa Augusta da Cruz ¹
Andrieli Sena Lacerda ¹
Izabel Melz Fleck ¹
* Leandro Fleck ¹

ANAEROBIC CODIGESTION OF AGROINDUSTRIAL EFFLUENTS: PERFORMANCE EVALUATION AND MODELING

Recibido el 28 de noviembre de 2024. Aceptado el 9 de julio de 2025

Abstract

Studies that have carried out the anaerobic co-digestion of starch factory effluent with effluent from the animal blood processing agroindustry are unprecedented in the literature. The present study is based on the hypothesis that anaerobic co-digestion can be used for the efficient simultaneous treatment of wastewater from the production of cassava starch and effluent from the processing of cattle and pig blood. Sludge from an anaerobic biodigester applied to the treatment of wastewater from the production of cassava starch was used as an inoculum for the anaerobic co-digestion process. The factors temperature and operating time were controlled, and their effects on the parameters color, turbidity and chemical oxygen demand (COD) were evaluated using a Central Composite Rotational Design (CCRD), consisting of 11 experimental tests. For each response variable, a quadratic mathematical model was generated, validated by Analysis of Variance. The maximum turbidity, color and COD removal efficiency observed in the treatment system was 100%, 90.54% and 68.85%, respectively. A significant effect was observed for the interaction between operating time and operating temperature, when evaluating the COD removal efficiency. The mathematical models were not statistically significant, as for all dependent variables the p-value was higher than the adopted significance level, of 10%. The hypothesis about the possibility of carrying out anaerobic co-digestion of starch factory effluent and animal blood processing effluent was confirmed by the study and is an innovative possibility for the consortium for the treatment of organic waste generated by agro-industrial companies.

Keywords: agroindustry, starch farming, environmental impacts, animal blood.

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AEDES AEGYPTI COMO BIOINDICADOR DA QUALIDADE AMBIENTAL FRENTE À AUSÊNCIA DE SANEAMENTO

* Gabriel Alves de Lima ¹
Geisa Freitas do Monte Silva ¹
Soraya Giovanetti El-Deir ¹
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AEDES AEGYPTI AS A BIOINDICATOR OF ENVIRONMENTAL QUALITY IN THE FACE OF LACK OF SANITATION

Recibido el 5 de diciembre de 2024. Aceptado el 7 de julio de 2025

Abstract

The universalization of basic sanitation services is a topic discussed worldwide, mainly in relation to the challenges related to the absence of these infrastructures and the difficulties in their management. The consequences of this inefficiency or absence of services impact several areas, including those related to the environment, society and health, such as the increased proliferation of arboviruses. Given that *Aedes aegypti*, vector of the arboviruses Dengue, Zika and Chikungunya, thrives in urban environments characterized mainly by the absence of sanitation and is responsible for the spread of these diseases, it has the potential to be considered an indicator organism (bioindicator), based on the idea that a bioindicator can provide information about environmental quality through its presence in an area or its proliferation rate. This study aims to analyze the species *A. aegypti* as a potential bioindicator to monitor the existence and/or effectiveness of infrastructures related to environmental sanitation in urban areas and ecotones in tropical climate zones. The methodology applied includes the analysis of parameters previously defined in the literature, weighted based on relevance and representativeness, represented by weights and scores. These parameters include factors such as well-defined taxonomy, numerical abundance and widely known ecological characteristics. The parameters analyzed indicated *A. aegypti* as an excellent bioindicator in the context of the evaluation of basic sanitation infrastructures.

Keywords: arboviruses, environmental management, public health.

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OBTENCIÓN DE SOLUCIONES DE HIERRO Y COBRE A TRAVÉS DE LIXIVIACIÓN DE RELAVES MINEROS CON AGUA DE MAR Y ÁCIDOS ORGÁNICOS

* Ricardo Zamarreño Bastías¹

OBTAINING IRON AND COPPER SOLUTIONS THROUGH LEACHING OF MINE TAILINGS WITH SEAWATER AND ORGANIC ACIDS

Recibido el 24 de diciembre de 2024. Aceptado el 22 de abril de 2025

Abstract

The results are presented when treating a mine tailings with high iron content and a lower percentage of Cu, with different non-traditional leaching techniques, using organic acids (citric acid and acetic acid), with concentrations of 0.5 M, as well as seawater, untreated, to prepare the leaching solutions. The acid that had the highest efficiency in extracting the Fe present in the tailings was citric acid. Copper extraction using the acids mentioned above had an equivalent yield. The leaching technique that was most efficient to extract the Fe was agitation, followed by column in reverse phase and leaching in raft. The solutions resulting from Fe can be used directly in industrial processes, without having a subsequent treatment process. This achieves sustainability and the application of the circular economy to metal mining, in a complex waste such as mine tailings.

Keywords: pan leaching, reverse phase column leaching, agitation leaching, organic acids, seawater.

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TRATAMIENTO DE ÁGUAS CINZAS UTILIZANDO CARVÃO DE RESÍDUO DE PODA ARBÓREA URBANA

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ASH WATER TREATMENT USING URBAN PRUNING TREE WASTE COAL

Recibido el 30 de enero de 2025. Aceptado el 7 de julio de 2025

Abstract

Research shows that the inadequate disposal of wastewater generates significant impacts on the environment, especially on the aquatic ecosystem, altering the availability of this resource. In order to ensure the safety and quality access of water for its various uses, effective treatments are required to remove pollutants and contaminants generated by anthropogenic activities. For this reason, the thermal degradation process was applied to tree pruning residues of Palmas - TO, classified as urban solid waste (MSW), at a temperature of 550° C and residence time of 30 m, in a reactor. fixed bed. The biochar obtained in the process yielded 54% and was subsequently activated to function as an adsorbent. The treatment of the gray water from clothes washing in a rural residence was performed by coagulation / flocculation / sedimentation followed by filtration with sand filters and activated carbon filter. Turbidity was reduced by 96% in the coagulation / flocculation stage, the filters worked with low turbidity effluent, and obtained 99% reduction. All solids had a reduction in the first stage of 69%, in the second 23% and 34% in the final stage for total solids. Fixed solids reduced 13% on coagulation / flocculation, 15% on sand filter and 13% on adsorption with biochar. The organic part of the solids presented removal of 95% in the first phase of the treatment, 86% in the sand bed and 45% in the activated carbon. The disinfection of the effluent after the treatment system corroborated the water quality to be reused.

Keywords: activated carbon, grey water, tree pruning.

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