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INFLUÊNCIA DA SATURAÇÃO DE FUNDO DE MACIÇOS FILTRANTES COMPONENTES DE WETLANDS CONSTRUÍDOS VERTICAIS APLICADOS NO TRATAMENTO DE ESGOTO SANITÁRIO

Mayara Oliveira dos Santos¹
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INFLUENCE OF BOTTOM SATURATION LEVEL OF THE
BED MEDIA IN VERTICAL FLOW CONSTRUCTED
WETLANDS APPLIED TO WASTEWATER TREATMENT

Recibido el 8 de agosto de 2015; Aceptado el 11 de octubre de 2016

Abstract

*This paper's goal was to evaluate the saturation level of the bed media of vertical constructed wetlands (VCW) applied to sanitary wastewater treatment through an experiment conducted during 210 days. Four glass columns (NPS of 96 mm and height of 0.55 m) filled with coarse sand ($d_{10} = 0.25$ mm) were set up with different bottom saturation heights: C1 (free drainage); C2 (0.20 m saturated); C3 (0.30 m saturated) and C4 (0.40 m saturated). The columns were intermittently fed with sanitary sewage, being the operation split in three consecutive operational days followed by four rest days. In each operational day, all columns were fed three times per day (9AM, 1PM and 5PM). Raw sewage and columns' treated effluents were periodically sampled and then submitted to physical-chemical analysis. Samples of the bed media were taken from the saturated/free drainage interface and from C2, C3 and C4 saturated zones. Also, DNA sequencing was performed using extracted DNA focusing on total bacterial community. The C4 setup (0.15 m of free drainage and 0.40 m of saturation) showed the biggest application potential in VCW since it presented COD removal of 88% and smallest total nitrogen concentrations in the effluent. The sequencing results identified 157 different bacteria genera, where C4 bottom displayed a total of 105 different genera and a relative proportion of 11.7% of nitrifying bacteria in the saturated/free drainage interface. The most abundant denitrifying genus in this zone was the *Rhodanobacter* (28.4%); for the bottom of C4, the most abundant genus was *Denitratisoma* (15.8%).*

Keywords: Bacterial community, Denitrification, Nitrification, Sanitary wastewater, Saturation Height, Vertical flow constructed wetlands.

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TRATAMIENTO DE EFLUENTES DE TANQUES DE PISCICULTURA POR ELECTROCOAGULAÇÃO

*José Pedro Varela da Silva ¹
Antônio Idivan Vieira Nunes ¹

TREATMENT OF AQUACULTURE WASTEWATER TANKS BY ELECTROCOAGULATION

Recibido el 26 de octubre de 2015; Aceptado el 11 de octubre de 2016

Abstract

For this work, we used the technique of electrocoagulation for the treatment of effluent from fish farms. An EC reactor at laboratory scale with a capacity of 1.5 L was assembled using a set of four plates of aluminum electrodes, a mechanical stirrer high torque microprocessor, wires with alligator clips and a voltage source with power adjustable. To determine the best operating condition of the reactor, an experimental design was performed using the software "Statgrafics", defining the operational variables and their respective intervals, which combined together, performing a total of 35 runs. Based on the results obtained by means of physical-chemical analysis in the laboratory, it can be stated that the initial pH=8, conductivity=1000 $\mu\text{S cm}^{-1}$, time=35 min., agitation=200 rpm and electrical current=2.5 A, are the optimal operating conditions of the reactor. Under these conditions, removal reached 84.95% for COD, 98.06% for nitrite, 82.43% for nitrate, 98.05% for total phosphorus and 95.32% for turbidity, resulting an operating cost of R\$ 4.59 per m^3 of treated effluent. Based on the results obtained, it was found that the analyzed parameters are in accordance with the standards established for fresh, class 2, by Conama Resolution nº 357/05 and nº 430/2011, for release of the final effluent in the receiving water bodies. The technique of electrocoagulation besides being an alternative, efficient and promising for treating effluents from fish farming, also proved to be environmentally friendly for taking the high consumption of reagents, contrary to what happens in conventional treatment.

Keywords: Aquaculture effluents, Electrocoagulation, Removal of pollutants.

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COMPOSIÇÃO DOS RCD GERADOS EM ETAPA DE PÓS OBRA ORIGINADAS DE CORREÇÕES PATOLÓGICAS EM EDIFICAÇÕES VERTICAIS

*Marcelo Oliveira Caetano¹
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COMPOSITION OF CONSTRUCTION AND DEMOLITION WASTE FROM PATHOLOGICAL RECTIFICATION IN VERTICAL BUILDINGS

Recibido el 20 de noviembre de 2015; Aceptado el 10 de octubre de 2016

Abstract

Post-construction, or rectification period, is the time after a building is finished that includes liability terms concerning the product delivered to the customer, meaning that the pathological manifestations or abnormalities against standards observed in a construction, even after it is finished, have to be rectified by the contractor. These rectification works are a potential source of construction and demolition waste (CDW). Yet, despite being usually small, the volumes of CDW generated require appropriate management according to legislation. Because of the difficulties to quantify CDW, whether due to the small volumes generated, the varied composition of this waste, or even the several possible reasons behind the need for rectification works, the present case study describes the grain size distribution of CDW in the post-construction stage of two buildings of different quality standards, premium and regular. Types of CDW and the respective rectification works that generated them were associated using the data provided by a building company about vertical housing constructions. The data analyzed were stored in the company's database, which keeps the records of rectification works in the post-construction period, and were used to estimate the amounts and types of CDW generated by each rectification intervention. The results show that most CDW generated was recyclable. Roughly 71% and 67% of the total CDW generated in the premium and regular buildings were potentially reusable, respectively. The highest occurrence of pathological manifestations (22% on average), and therefore the greatest potential to generate CDW was observed for categories "Waterproofing", "Plumbing", and "Solidity and Safety of Construction". Even though grain size distribution from CDW from the premium and regular constructions were similar, the pathological manifestations rectified in each varied significantly. While 161 rectification works were carried out in the premium building, 399 were necessary in the regular construction. Severe problems were observed in the latter, in the category "Solidity and Safety of Construction" due to quality issues in materials and labor. The results point to a likely relationship between quality of a building and the volume of CDW it generates.

Keywords: CDW, Construction and Demolition Waste, Post-Construction Stage, Pathological Manifestations, Construction Standard.

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AVALIAÇÃO DO EFEITO DA VELOCIDADE ASCENSIONAL DO ESGOTO BRUTO E A FREQUÊNCIA DE RETIRADA DE LODO NA GERAÇÃO DE ESCUMA EM REATORES UASB OPERANDO EM ESCALA PLENA

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UPFLOW VELOCITY EFFECT ASSESSMENT OF RAW SEWAGE
AND FREQUENCY OF SLUDGE DISCHARGE IN SCUM
GENERATION IN UASB REACTORS FULL SCALE OPERATING

Recibido el 29 de diciembre de 2015; Aceptado el 11 de octubre de 2016

Abstract

The UASB reactor is widely used for sewage treatment. Except for the excess of scum formation, the UASB reactor is well accepted. The excess of scum can be limited through some technical adjustments. In this work, the up flow velocity of sewage and the frequency of sludge removal from reactor in full-scale operation was assessed. The experiments were conducted in real scale at Vassoural Waste Water Treatment Plant (WWTP), located in South-West of Parana State, Brazil. The Vassoural WWTP has three reactor arranged in parallel and the flow rate is 240 L.s⁻¹. The purpose of experiment were to assess the ascendant speed and frequency of sludge removal effect on scum formation. For this, firstly, each reactor worked in different speed. The reactor whit highest hydraulic retention time (THR) formed scum 3 times higher in the decanted area and 4.8 times higher in the three phase separator (TPS) than the reactor with lowest THR. In the second batch of experiments the time of sludge removal from reactor was assessed. The sludge was removed in different periods. The best result was obtained for the reactor, which the sludge was removed in interval of 3 days. The amount of scum was 2 times less in decanted area and 4.5 times less in the TPS than the reactor which sludge discharge with 15 days interval. Also, the oil and grease content in the scum was 1.127 mg.kg⁻¹ and 1.413 mg.kg⁻¹, respectively. This result indicates that lipids concentrate in scum instead sludge.

Keywords: *anaerobic sludge, scum, sewage, UASB reactor, upflow velocity.*

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EMISSÕES DE GASES DE EFEITO ESTUFA DE ESTAÇÕES DE TRATAMENTO DE EFLUENTES DOMÉSTICOS: ESTUDO EM UMA LOCALIDADE DA AMAZÔNIA LEGAL

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EMISSIONS OF GREENHOUSE GASES OF DOMESTIC
WASTEWATER TREATMENT PLANTS: STUDY ON A CITY
OF LEGAL AMAZON

Recibido el 22 de febrero de 2016; Aceptado el 17 de junio de 2016

Abstract

Several methods and domestic wastewater treatment stages have different potentials for greenhouse gas (GHG) production. This study estimated the emission of CH₄ and CO₂ of a sewage treatment line, in real scale for one year, in the municipality of Cacoal - RO and held a comparison of current emissions with the possible emissions if new treatment processes were adopted. The estimate of CH₄ was carried out by the IPCC method and an estimated amount of CO₂ was calculated from life cycle analysis (electricity and fuel used in WTP). The general issue of WTP was 6975.45 tons of carbon equivalent in the year. Simulating GHG emissions to other treatment systems, it was noted that emissions would be 99% lower for Activated Sludge Systems (conventional), 98.5% lower for Activated Sludge (extended aeration) and 3.5% higher for systems using UASB reactors followed by activated sludge system. Therefore, it concluded that the selection of domestic wastewater treatment methods should also take into consideration the potential for greenhouse gas emissions.

Keywords: emission of greenhouse gases, climate change, domestic wastewater treatment.

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REMOÇÃO DE METAIS EM RESÍDUOS DE ESPECTROMETRIA DE ABSORÇÃO ATÔMICA

METALS REMOVAL IN WASTE OF ATOMIC ABSORPTION SPECTROMETRY

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Carlos Nobuyoshi Ide¹
Bruno Gabriel Lucca¹
Jonas de Sousa Correa¹
Maria Lúcia Ribeiro¹

Recibido el 29 de febrero de 2016; Aceptado el 22 de abril de 2016.

Abstract

The laboratory effluents are sources of contamination that contribute to serious environmental impacts, mostly liquid waste containing heavy metals. This work proposes several treatment methods that aim the removal of metals present in waste of Atomic Absorption Spectrometry. The proposed methods based on reactions of chemical precipitation, coagulation/flocculation and adsorption. Among the treatments performed, the Treatment 4 (pH adjustment and application of 100 mg.L⁻¹ of aluminum sulfate), in the initial pH 8, was the most appropriate for the waste treatment in question, as in economic terms as in the production of solid waste and environmental legislation. However, the post-treatments with activated carbon, were those with the highest performance in removing for all the analyzed metals. These treatments are more expensive and produce much more solid waste, though.

Keywords: Activated Carbon Adsorption, Coagulation/Flocculation, chemical precipitation.

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THEORETICAL ESTIMATE AND MULTIRESIDUE ANALYZE USING SPME-GC- IT/MS/MS FOR MANAGEMENT OF PESTICIDES IN WATER OF THE RURAL ZONE OF CEARÁ, BRAZIL

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ESTIMATIVA TEÓRICA E ANÁLISE MULTIRRESÍDUO
USANDO SPME-GC-IT/MS/MS PARA GERENCIAMENTO DE
AGROTÓXICOS EM ÁGUA DA ZONA RURAL DO CEARÁ,
BRASIL

Recibido el 30 de mayo de 2016; Aceptado el 13 de octubre de 2016

Abstract

The paper aimed to evaluate the pesticide contamination in groundwater and surface waters in Iguatu, important city of High Jaguaribe basin, in the rural zone of Ceará, Brazil. United States Environmental Protection Agency (USEPA) model, Groundwater Ubiquity Score (GUS) index (groundwater) and GOSS method (surface water) were applied to analyze the theoretical risk of contamination of water. A survey of the main active ingredients used in local crops was performed through and data collection with producers of the region. Significant percentage of substances was considered high toxicity (I and II). About 40% of the pesticides investigated showed high potential of contamination in groundwater, according EPA and GUS index. Evaluation by GOSS method showed high risk of contamination in surface waters to clethodim, lambda-cyhalothrin, paraquat, atrazine and picloram. Screening of residues using solid phase microextraction (SPME) and gas chromatography mass spectrometry (GC-IT/MS/MS) was satisfactory. It was not detected presence of pesticides in surface water and groundwater samples of rural zone of Ceará, Brazil. The toxic residues management is important to ensure the quality of water resources and the environment.

Key Words: multiresidue, SPME, chromatography, groundwater, surface water.

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