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MODELO PARA VERIFICAÇÃO DA AMOSTRAGEM DE EFLUENTES LÍQUIDOS EM MINAS GERAIS, BRASIL

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VERIFICATION MODEL OF WASTEWATER SAMPLING IN MINAS GERAIS, BRAZIL

Recibido el 21 de junio de 2016; Aceptado el 4 de mayo de 2018

Abstract

Disposal of untreated industrial wastewater in water bodies generates negative impacts to the environment. To discharge industrial wastewater to the local sewage network, it is required to follow monitoring program of wastewater conditions, when applicable, regulated by the local sanitation company. In Minas Gerais, Brazil, some industrial wastewater generators can opt to discharge in Minas Gerais Sanitary Company - COPASA's sewage system, however the requirements from Norma Técnica T187/5 must be followed, which defines the maximum concentrations permitted for some substances. Sample collection process for wastewater and its accurate representation are a challenge for those involved. Therefore, the aim of this paper is to present a model of checklist for the assurance of quality in the collection of wastewater process, using as guide the Norma Técnica ABNT: NBR 9898/1987, the Guia Nacional de Coleta e Preservação de Amostras - GNCPA and the Standard Methods of Examination of Water and Wastewater - SMEWW. A comparative table was elaborated including these references, also a checklist was made, composed of questions that works as a guideline to evaluate the quality in the collection of wastewater. The checklist was tested in some business, in order to best fit the demand of its users. The improvement of management system is hoped, by assuring the preservation of the samples' characteristics as maximum as possible and turning wastewater sample collection more rigorous. Assuring a more representative sample for analysis is a way to get trustful results from industrial activities that have a potential negative impact to the environment.

Keywords: environmental audit, environmental management, environmental monitoring, industrial effluents.

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ESTUDO DA FASE HIDROLÍTICA NO PROCESSO DE CODIGESTÃO ANAERÓBIA DE RESÍDUOS SÓLIDOS ORGÂNICOS

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STUDY OF THE HYDROLYTIC PHASE IN THE ANAEROBIC CODIGESTION PROCESS OF ORGANIC SOLID WASTE

Recibido el 12 de enero de 2017; Aceptado el 6 de noviembre de 2017

Abstract

Anaerobic digestion is a technological alternative widely used in the treatment of solid organic residues that can be fermented, with the goal of generating methane gas as a final product, and is considered a promising source of renewable energy. In this work, the anaerobic codigestion process of vegetable solid waste (RSV) plus anaerobic sanitary sewage sludge (LAES) was investigated in the proportion of 80 and 20% (percentage by weight) in the hydrolytic phase. The total solids concentration of the substrate (SVR + ASS) was 4%, using an anaerobic batch reactor (RAB), with a unit volume of 20 liters and monitored in ambient temperature conditions in three different phase. From the total COD mass fed to the reactor, the percentages of the total COD hydrolyzed mass were 26.3, 22.2 and 13.1% respectively in the first, second and third phase, thereby increasing the COD mass of the filtrate. The relationships established between the masses of the filtered COD and the volatile fatty acids ranged from 2.8 to 0.86, and the magnitude of the higher ratios were found in the "in natura" substrate mass. In relation to the mass of the nitrogenous material, it was observed a reduction of 89% of the mass of organic nitrogen present in the substrate, associated to the ammonification process and consequently expressive increase of the mass of ammoniacal nitrogen, and it can be observed that the hydrolysis efficiency of the mass of nitrogenous material was much more expressive than that of the mass of carbonaceous material.

Keywords: codigestion, batch reactor, anaerobic sewage sludge, vegetable waste.

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QUANTIFICAÇÃO DA MATÉRIA ORGÂNICA EM RIOS DA AMAZÔNIA BRASILEIRA SOB A INFLUÊNCIA DE RESÍDUOS DA INDÚSTRIA DE CURTUME

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QUANTIFICATION OF ORGANIC MATTERS IN RIVERS OF THE BRAZILIAN AMAZON UNDER THE INFLUENCE OF RESIDUES FROM THE CURTUME INDUSTRY

Recibido el 27 de enero de 2017; Aceptado el 9 de mayo de 2018

Abstract

Posse, Sem Nome and Campo Alegre streams, located near the Tocantins industry in the municipality of Governador Edison Lobão, are being degraded due to the release of liquid and solid industrial waste of organic origin, causing, in most cases, the ichthyofauna death. The objective of this study was to quantify the organic load in the sediment of the center of each aquatic body and surface waters of the above mentioned streams, as well as to evaluate its impact on the water bodies. Samples were collected in the rainy and dry season, in 6 sampling points, 2 points in Sem Nome stream, 2 in the Posse, 1 in the liquid and solid waste tank and 1 in the Campo Alegre river. The water samples were collected in PET bottles, acidified and conditioned in thermal boxes and the sediment samples were collected on the bed surface of the water bodies and stored in plastic bags. The results showed that the concentrations of organic matter indicate inefficiency of the process of removal of organic matter by the tannery. The observed variations for the physical-chemical parameters indicate the anthropic contribution in the process of degradation of these water bodies.

Keywords: contamination; water bodies; tanning; sediment; organic matter.

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PATÓGENOS EM ÁGUAS CINZA: REVISÃO

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PATHOGENS IN GREYWATER: REVIEW

Recibido el 3 de febrero de 2017; Aceptado el 15 de marzo de 2018

Abstract

The reuse of greywater is relevant considering the growing water scarcity problems in the world. However, its use without adequate treatment presents risks to human health, as pathogens may be present in this effluent. To provide safe reuse, microbiological risk assessment studies are recommended. To do so, it is essential to gather information on possible pathogens and indicators present in this fraction of domestic sewage. Most studies available in the literature found no pathogens in greywater. However, some other studies have detected bacteria, viruses and protozoa, varying from 0.4 organisms.L⁻¹ of Cryptosporidium to 10⁶ (CFU.100mL⁻¹) of Salmonella. Several authors reported that the performance of pathogens analysis was not technically and financially feasible, and adopted the use of biological indicators instead. However, indicator organisms tend to be influenced by other microorganisms or chemicals present in the greywater. Therefore, it is neither recommended to use a single indicator to verify fecal contamination, nor to use biological indicators to estimate the concentration of pathogens in greywater, once it might underestimate or overestimate the risks.

Keywords: domestic sewage, fecal contamination, reuse, risk assessment.

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TRATAMENTO DE LODO DA INDÚSTRIA TÊXTIL E PRODUÇÃO DE BIOGÁS EM REATOR UASB

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TEXTILE INDUSTRY SLUDGE TREATMENT AND BIOGAS PRODUCTION IN UASB REACTOR

Recibido el 13 de febrero de 2017; Aceptado el 15 de noviembre de 2017

Abstract

The purpose of this study was to evaluate the biogas production and efficiency of the treatment for textile sludge in a laboratory-scale 16 L UASB reactor operated with a TDH of 24 h at a temperature of $33 \pm 2^\circ\text{C}$, fed with a mixture of textile sludge substrates and wastewater from the food industry. Among the parameters monitored during the 275 days of operation of the reactor it was found that the average efficiency of removal of STV, CO, DQO, BOD, PT and NT ranged from 81 to 94%, 75 to 91%, 89 to 97%, 87 to 94%, 76 to 95% and 76 to 96%, respectively. Despite the high efficiencies obtained during the UASB monitoring, the average biogas decreased throughout the phases (25.24 L d^{-1} : phase 1; 16.74 L d^{-1} : phase 2; 9.50 L d^{-1} : phase 3 and 0.95 L d^{-1} : phase 4), and the average concentrations, in affluent, of AOVs (721 mg L^{-1} : phase 1; 230 mg L^{-1} : phase 4), DBO (4128 mg L^{-1} : phase 1; 1975 mg L^{-1} : phase 4) and CO (2016 mg L^{-1} : phase 1; 465 mg L^{-1} : phase 4).

Key Words: biogas, textile sludge, UASB reactor.

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APLICAÇÃO DO MÉTODO MULTICRITÉRIO M-MACBETH NA COLETA SELETIVA NO MUNICÍPIO DO CRATO/CE

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APPLICATION OF THE MULTICRITÉRIO M-MACBETH MULTI-CRITERIA METHODOLOGY TO SELECTIVE COLLECTION IN THE MUNICIPALITY OF CRATO – CE

Recibido el 16 de febrero de 2017; Aceptado el 21 de marzo de 2018

Abstract

Consumption and sustainability have currently become key issues, due to the exponential increase of environmental problems. Therefore, the proper destination of solid waste becomes more important on a daily basis. One of these problems are PET containers (polyethylene terephthalate). It is the type of packaging most widely used in Brazil, which, when recycled, has many advantages over others in the market in terms of energy and water consumption, as well as the environmental impact, and social benefits, among others. The objective of this paper is to perform a multi-criteria analysis on the selective collection of PET items by applying a M-Macbeth analysis in the municipality of Crato-CE. The methodology is based on data collection and interviews with those responsible for the Association of Crato Recyclers. It involves exploratory research with a qualitative approach. The results indicate that, in spite of advances, expansion and improvement of the association are necessary, especially in terms of infrastructure, business, financial management, environmental education and the direct participation of the population in this new consumption-disposal paradigm.

Keywords: PET, M-Macbeth, selective collect, sustainability.

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EFICIÊNCIA DE UMA ESTAÇÃO DE TRATAMENTO DE ESGOTOS COMPOSTA POR REATOR ANAERÓBIO TIPO UASB, SEGUIDO DE UM FLOTADOR POR AR DISSOLVIDO

EFFICIENCY OF A SEWAGE TREATMENT PLANT COMPOSED OF AN ANAEROBIC UASB REACTOR, FOLLOWED BY DISSOLVED-AIR FLOTATION

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Abstract

The combination of anaerobic reactors with dissolved air flotation promote high reductions in the amounts of organic matter in wastewater and also have good results in the removal of phosphorus. This study aimed to evaluate the efficiency of the wastewater treatment station known as ETE PRATA, which has UASB system followed by dissolved air flotation in the city of Palmas Tocantins, Brazil. At work it was quantified the removal of nutrients, organic matter and total suspended solids. The experimental data were obtained through the analysis on Effluent Laboratory of Odebrecht Environmental|Saneatins company between April 2013 and April 2014. As for the removal of organic matter (BOD and COD), ETE PRATA showed high efficiency, keeping results always below the limits established in the literature. Regarding the removal of nutrients, ETE remained phosphorus removal percentage always above 77%, except for the months of June, July and October 2013, where there was no removal. As for nitrogen removal was negligible. It is concluded that ETE PRATA has excellent removability of organic matter, with removal values reported in the literature and meets the following release parameters pH, Temperature and DBO according to Resolução CONAMA 430/11.

Keywords: nutrients, organic matter, polishing, removal of phosphorus, wastewater.

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EFEITO DE FATORES GEOMÉTRICOS E HIDRÁULICOS SOBRE A VAZÃO PERDIDA E O EXPOENTE DE VAZAMENTO EM SISTEMA DE DISTRIBUIÇÃO DE ÁGUA

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EFFECT OF GEOMETRIC AND HYDRAULIC FACTORS ON LEAKAGE FLOW AND LEAKAGE EXPONENT IN A WATER DISTRIBUTION SYSTEM

Recibido el 8 de marzo de 2017; Aceptado el 21 de febrero de 2018

Abstract

This paper modeled a real water distribution system (WDS) with a large number of randomly distributed leaks to determine whether their combined behavior can produce the range of leakage flow rate percentage and system leakage exponents found in field studies. The pressure-leakage relation of individual leaks was modeled with the FAVAD equation that assumes a linear relationship between leak area and pressure, known to be valid for elastically deforming leaks. The characteristics of individual leaks and number of leaks were determined based on current best understanding of leakages in WDSs. The effect of the area and the amount of background leaks, the area of potentially detectable leaks, the pressure load and the discharge coefficient on the leakage flow rate and the leakage exponent (N) in a WDS was studied using factorial design. The results show that the five most relevant factors on the leakage flowrate in a WDS, in decreasing order, were the area of potentially detectable leaks, the pressure load, the interaction between the area of potentially detectable leaks and the pressure load, the discharge coefficient, the interaction between the area of potentially detectable and the discharge coefficient and the interaction between pressure load and the discharge coefficient. It was verified that the FAVAD equation could explain the values of leakage exponents found in real WDSs. In a sequence of diminishing relevance, the significant factors, or the combination of them, on the leakage exponent were the area of potentially detectable leakage, the number of background leaks and the interaction between the area potentially detectable leaks and the area of background leaks. Finally, we present some practical applications to WDSs.

Keywords: leakage area; factorial design; computational modelling; FAVAD equation; EPANET.

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Investigación, desarrollo y práctica.

ESTUDO DA CINÉTICA E DA DIFUSIVIDADE EFETIVA NA SECAGEM DE LODO DE ESGOTO

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STUDY OF KINETICS AND EFFECTIVE DIFFUSIVITY ON SEWAGE SLUDGE DRYING

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Abstract

The management of sewage sludge is a complex and expensive activity. If poorly executed, it can compromise expected environmental and health benefits of the system. Since drying is an essential step in the process, its investigation is extremely important because it allows volume reduction and consequently covers the cost in subsequent steps. The aim of the present work was to investigate the drying of sludge obtained from a facultative pond by means of a low temperature drier using two methods of dehydration: thermal drying by infrared lamps and convective drying. In order to understand the process kinetics, three sludge thicknesses (10, 25 and 50 mm) were tested. The obtained data was adjusted to the Midelli model and it fit to satisfactory results ($r > 0.99$), despite the use of layers higher than those presented in the literature. The effective diffusivity range found was $5.170 - 7.13E-09$, $9.286 - 9.464E-09$ and $2.120 - 2.504E-08$ ($m^2 \cdot s^{-1}$) for the thicknesses of 10, 25 and 50 mm, respectively.

Keywords: effective diffusivity, sludge drying, thermal dry.

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AVALIAÇÃO DO DESAGUE DE LODO FÍSICO-QUÍMICO DE ESTAÇÃO DE TRATAMENTO DE ÁGUA POR GEOTÊXTEIS

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SLUDGE DESAGUE ASSESSMENT PHYSICAL AND CHEMICAL WATER TREATMENT STATION BY GEOTEXTILE

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Abstract

The sludge generated in water treatment station (WTP) is a common problem in the sanitation service in Brazil. To reduce the sludge volume of water were used bags of geotextile, made of high density polypropylene woven that can promote a sludge reduction over 90%. In this study was evaluated the sludge generated in the ETA Botafogo (Recife - PE). The sludge collected in the decanter was packed in bags, with and without polymer conditioning, for 3 months. Physical and chemical analysis was carried out to evaluate the process. After the bags were completely filled and the percolation finished, the bags were opened. The sludge samples were submitted to the analysis of humidity (%) and metals (Fe, Cu, Pb, Zn, Mn, Al). Among the metals present, aluminum was chosen as the object of study, because aluminum sulphate was used as a coagulant in this WTP. The results showed that the concentration of metals in the sludge dried, the concentrated sludge and the bag drained liquid showed that 99% of Fe, 98% of Cu, 99% of Pb, 47% of Mn, 100% of Zn and 100% of Al, were retained in the slurry that received the addition of the polymer. When the slurry did not receive polymerization, the retention was 98%, 98%, 95%, 55%, 100% and 98% of the respective metals.

Keywords: water treatment, sludge, geotextile, bag, dehydration.

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MICROCLIMA URBANO: EVALUACIÓN DE LA CIUDAD Y LA CALIDAD DEL HÁBITAT POR INCREMENTO DE TEMPERATURA

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URBAN MICROCLIMATE: EVALUATION OF THE CITY AND THE HABITAT QUALITY FOR INCREASED TEMPERATURE

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Abstract

The effect of climate change is perceived by the characteristics of urban concrete foliage, glass facades and asphalt surfaces of built structures and roads. The widespread use of air conditioning in densely urbanized areas, as well as the increase in commercial developments, massive increase in automobile traffic that are important factors for a warmer world. The research evaluates the urban microclimate to establish the average temperature and relative humidity, in the case study zone and its affection of manifest fixed for winter and summer which are the critical stations. The methodological procedure to be implemented is an applied experimental research, which supports urban planners not to have to participate scientifically to evaluate the thermal location of their projects and therefore can accelerate the design process in a warmer world. Based on the results, the urban heat islands and their thermal scale are established. The objective of the present investigation is to determine the urban microclimate by carrying out the evaluation of the city and the quality of the habitat in Tampico, Mexico.

Key Words: Thermal scale, increase in temperature, urban heat islands.

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COMPOSTAJE DE AGAR RESIDUAL CADUCO GENERADO EN UN LABORATORIO DE MICROBIOLOGIA

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COMPOSTING OF RESIDUAL EXPIRED AGAR FROM A MICROBIOLOGY LABORATORY

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Abstract

*This work shows the feasibility of aerobic composting, for the agar waste generated in a microbiology laboratory. Composting was of two piles, with the residual agar and compared with 2 piles of control, without residual agar. The pH values at the end of composting, they did not show statistically significant differences with a value of $P = 0.028$, about control. Values that registered of temperature $>40\text{ }^{\circ}\text{C}$, in piles with agar, slightly higher than in the piles without agar. Phytotoxicity results were obtained with plants *P. vulgaris* and *L. culinaris*, however, with a value of $P = 0.61$, no statistical difference were found between the compost. The Biomass values, obtained differences only in the group with *P. vulgaris*. It is important the dedication that superior educational institution should have on the substantial development. Becoming an example to society in the economical sectors and government.*

Keywords: aerobic process, waste agar, *E. foetida*, *L. culinaris*, *P. vulgaris*.

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