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La *Revista AIDIS de Ingeniería y Ciencias Ambientales: Investigación, desarrollo y práctica* es una publicación electrónica cuatrimestral coeditada por AIDIS y el Instituto de Ingeniería UNAM. Publica contribuciones originales de calidad y actualidad evaluadas por pares, dentro de su área de competencia. Se presentan trabajos que abarcan aspectos relacionados con el conocimiento científico y práctico, tanto tecnológico como de gestión, dentro del área de Ingeniería y Ciencias Ambientales en Latinoamérica.

El enfoque es multidisciplinario, buscando contribuir en forma directa a la generación de conocimiento, al desarrollo de tecnologías y a un mejor desempeño profesional. Entre los temas cubiertos por la revista están los siguientes: agua potable, calidad de agua, aguas residuales, residuos sólidos, energía, contaminación, reciclaje, cambio climático, salud ambiental, nuevas tecnologías, ética, educación, legislación y política ambiental, gestión ambiental, sostenibilidad y participación social, entre otros.

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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Editorial

En abril de 2021 asumí el cargo de Editor en Jefe de la ***Revista AIDIS de Ingeniería y Ciencias Ambientales: Investigación, desarrollo y práctica***. Esta labor es todo un privilegio, así como una gran responsabilidad para seguir consolidando a la revista como un punto de referencia para académicos de habla hispana y portuguesa. Uno de los esfuerzos más importantes en esta nueva etapa de la revista se enfoca en la aceleración del procesamiento de los artículos recibidos, con lo cual, el tiempo promedio de aceptación se reduce de manera sustancial. Por otra parte, a partir del número de Agosto de 2021 se ha instituido la "***Selección del Editor***", la cual constituye una distinción a la calidad científica, técnica y relevancia de un artículo por cada número publicado. Es también un placer para mí presentar a los nuevos integrantes del Consejo Editorial, todos ellos son destacados investigadores en sus respectivas áreas de investigación. Les agradecemos su trabajo y les damos una calurosa bienvenida a todos ellos.

Guillermo Quijano
Editor en Jefe
Instituto de Ingeniería, Universidad Nacional Autónoma de México.

Fabiana Passos* - *Universidade Federal de Minas Gerais

Fabiana es graduada en Ingeniería Ambiental por la Universidade Federal de Viçosa (Brasil). En 2010 obtuvo su grado de maestría en Manejo de Recursos Naturales y Medio Ambiente por la Brandenburgische Technische Universitat (Alemania) y en 2014 su título de doctorado en Ingeniería Ambiental por la Universitat Politecnica de Catalunya (España). Durante el doctorado investigó pretratamientos para la digestión anaerobia de microalgas provenientes de sistemas de depuración de agua residual doméstica. Actualmente, es profesora en el Departamento de Ingeniería Sanitaria y Ambiental de la Universidade Federal de Minas Gerais (Brasil), donde continúa trabajando con la digestión anaerobia de diferentes efluentes y residuos orgánicos, con énfasis en pretratamientos, co-digestión y recuperación de subproductos para fomentar un desarrollo autónomo local, particularmente en países de Latinoamérica.

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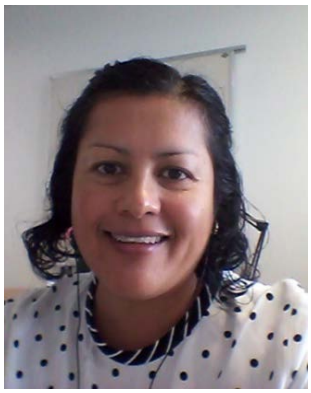
Vol. 14, No.3. Editorial
6 de diciembre de 2021



Sonia Arriaga - Instituto Potosino de Investigación Científica y Tecnológica (IPICYT)

Sonia es Ingeniero Químico por la Facultad de Ciencias Químicas de la Universidad Autónoma de San Luis Potosí en 1999, Maestra en Ciencias por la misma institución en 2001, y obtuvo el grado de Doctor en Ingeniería Química por la Universidad Autónoma Metropolitana-Iztapalapa en el año 2005. Ha realizado estancias en Lund University, Aalborg University y National University of Ireland Galway. Desde el 2006 se desempeña como Profesor Investigador de la Division de Ciencias Ambientales del IPICYT y actualmente es Investigador Titular B y miembro de la Academia Mexicana de Ciencias. Sus principales contribuciones se centran en mejorar la eliminación de contaminantes del aire mediante el uso de sistemas de partición, consorcios fúngicos y ha sido pionera en el uso de sistemas híbridos (biológicos/procesos de oxidación avanzada) de tratamiento de emisiones, así como en el monitoreo y eliminación de bioaerosoles en aire de interiores.

Quetzalcóatl Hernández – Universidad Nacional Autónoma de México (UNAM)

Quetzalcóatl realizó sus estudios de licenciatura en Ingeniería Mecánica en la Universidad Autónoma Metropolitana, su Maestría en Finanzas en la Universidad de Xalapa y su Doctorado en Ingeniería en la Universidad de Almería. Actualmente es profesor de tiempo completo en la Escuela Nacional de Estudios Superiores de la UNAM, Unidad Juriquilla. Ha creado grupos de investigación, dirigido proyectos nacionales e internacionales, cuenta con más de 40 artículos científicos publicados en revistas de alto impacto. Su línea de investigación se basa en la evaluación de los recursos renovables para generar energía eléctrica.

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Vol. 14, No.3. Editorial
6 de diciembre de 2021

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Raúl es Ingeniero Químico por la Universidad de Valladolid (España) y Doctor en Biotecnología Ambiental por la Universidad de Lund (Suecia). Actualmente es Catedrático de Tecnología del Medio Ambiente en el Departamento de Ingeniería Química y Tecnología del Medio Ambiente de la Universidad de Valladolid, e Investigador del Instituto de Procesos Sostenibles. Sus líneas de investigación son el tratamiento biológico de emisiones gaseosas, tecnologías de purificación/valorización de biogás y procesos de microalgas para biorremediación, llevando a cabo tanto proyectos de investigación fundamental como aplicada.

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Investigación, desarrollo y práctica. ISSN 0718-378X

Vol.14, No.3
6 de diciembre de 2021

Tabla de Contenido
Vol. 14, No. 3

Revista AIDIS de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica. ISSN 0718-378X

Vol.14, No.3
6 de diciembre de 2021

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6 de diciembre de 2021

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Vol.14, No.3
6 de diciembre de 2021

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Vol.14, No.3
6 de diciembre de 2021

Revista AIDIS de Ingeniería y Ciencias Ambientales:
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de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

TRATAMIENTO BIOLÓGICO DE RESIDUOS AGRÍCOLAS POR DIGESTIÓN ANAEROBIA Y NITRIFICACIÓN – DESNITRIFICACIÓN

* Mario José Lucero [1]
Lorna Guerrero [2]

BIOLOGICAL TREATMENT OF AGRICULTURE SOLID WASTE BY ANAEROBIC DIGESTION AND NITRIFICATION - DENITRIFICATION

Recibido el 13 de marzo de 2020. Aceptado el 13 de enero de 2021

Abstract

The production of biogas from agricultural solid waste as a source of unconventional alternative energy, is an important topic, so that in this research the principal goal was analyzed the rate generation of biogas, using an initial substrate with a mixture of chicken manure in a 90% and Opuntia Ficus Indica in a 10%, and a temperature of 30 ° C. The process was developed according to test of anaerobic biodegradability. Subsequently, the residue from anaerobic digestion was subjected to nitrification - denitrification for biological nitrogen removal. The removal percentage of organic matter in anaerobic digestion was 43% and the rate of generation of methane gas was 15.8 L CH_4 / kg ST and a HRT of 90 days. In the process of nitrification - denitrification the removal rate of ammonia nitrogen was 54.7% with HRT of 46 days, although at this stage nitrification got 81% of ammonia nitrogen conversion to other forms of nitrogen was obtained ; removal efficiency is reduced because of the nitrate suffered amonificación and return to ammonia nitrogen mainly due to the high 52 C/N. This caused that some of the carbon would be submitted to the methanation process in turn enhancing the process ammonification.

Keywords: *agriculture solid wastes, anaerobic digestion, biogas, denitrification, nitrification.*

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de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

LOGISTICA REVERSA DE MEDICAMENTOS VENCIDOS E EM DESUSO EM UM PAÍS EM DESENVOLVIMENTO. ESTUDO DE CASO: JOAO PESSOA – PARAÍBA/BRASIL

* Ianina Gonzalez Toscano [1]
Claudia Coutinho Nóbrega [2]

REVERSE LOGISTICS OF EXPIRED AND UNUSED DRUGS IN A DEVELOPING COUNTRY. CASE STUDY: JOÃO PESSOA - PARAÍBA / BRAZIL

Recibido el 13 de abril de 2020. Aceptado el 13 de enero de 2021

Abstract

Drug residues are commonly disposed of inappropriately, in toilets and sinks or as household waste, which may cause a risk to the environment and public health. Proper solid waste management enables to minimize the production and provide appropriate final disposal. This paper aimed to analyze the structure of the reverse logistics of the collection and the disposal of expired and/or disused medicines in pharmaceutical establishments in the city of João Pessoa / PB - Brazil. The study was developed through the application of a checklist, in pharmaceutical establishments and an interview with the responsible in the medicines sector of the Municipal Health Surveillance. The results showed that most of the pharmacies and drugstores in the city of João Pessoa interviewed, have a solid waste management plan (99.02%) and practice the reverse logistics of expired and disused drugs (95.1%). There was also a lack of information available to the population regarding the correct disposal of medicines. This results will assist in making decisions regarding the reverse logistics of expired and unused medicines in the legislative and operational scope, in the pharmaceutical establishments in the municipality under study.

Keywords: *disposal, drugs, management, pharmacies, solid waste.*

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Vol. 14, No.3, 1013-1033
6 de diciembre de 2021

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de Ingeniería y Ciencias Ambientales: Investigación, desarrollo y práctica.

INTEGRATED ENERGY BALANCE OF THE PRODUCTION OF QUALITY "CACHAÇA" AND BIOFUEL

* Regiane Pereira Roque [1]
Roberto Precci Lopes [2]
Marcio Arêdes Martins [2]

Recibido el 16 de abril de 2020. Aceptado el 12 de abril de 2021

Abstract

The production of small-scale farm fuel alcohol is a viable economic activity, but in Brazil, there are few studies on the energy balance of its production. In the present work, the energy balance of the integrated production of quality "cachaça" and fuel alcohol at the farm level was carried out, as well as the determination of technical coefficients in a microdistillery in Minas Gerais (Zona da Mata), Brazil, for the production of sugar cane, cachaça and farm fuel alcohol. The productive capacity of this microdistillery in the analyzed period was 5,271.63 liters of cachaça and 658.95 liters of farm alcohol per day. Energy expenditure in the production of sugar cane (agricultural phase) was 245.14 MJ per ton of cane (MJ TC^{-1}), with 80% of the total of this energy going to the production of cachaça and 20% for the production of sugarcane fuel alcohol. The energy expenditure for the production of cachaça and fuel alcohol from sugar cane was 30.44 MJ TC^{-1} (industrial phase), of which 80% went to obtain cachaça and 20% for the farm fuel alcohol. The energy output / input ratio was 4.61 (fuel alcohol + excess bagasse). Much of the energy demand is due to the use of nitrogen fertilizers and diesel oil. The farm alcohol produced had a renewability index of 0.27, showing it to be a renewable fuel.

Keywords: *agroenergy, brandy, cachaça, farm ethanol, sugar cane.*

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Vol. 14, No.3, 1034-1049
6 de diciembre de 2021

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de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

OTIMIZAÇÃO DA EFICIÊNCIA NA REMOÇÃO DE FÓSFORO EM EFLUENTE DE REATOR TIPO UASB POR MEIO DA FAD E DA SEDIMENTAÇÃO

* Daiane Cristine Kuhn [1]
Carlos Raphael Pedroso [2]
Carlos Magno de Sousa Vidal [3]
Jeanette Beber de Souza [3]

OPTIMIZATION OF EFFICIENCY IN THE REMOVAL OF PHOSPHORUS IN EFFLUENT FROM UASB TYPE REACTORS THROUGH FAD AND SEDIMENTATION

Recibido el 22 de abril de 2020. Aceptado el 13 de enero de 2021

Abstract

Upflow anaerobic sludge blanket (UASB) reactors have low efficiency in removing phosphorus, organic matter and pathogens, requiring the use of a post-treatment to improve the quality of the effluent. The excessive supply of nutrients is one of the main causes of water eutrophication. Thus, dissolved air flotation (DAF) and sedimentation were investigated in the post-treatment of the UASB reactor effluent, aiming at the removal of phosphorus, chemical oxygen demand (COD) and turbidity. The characterization of raw sewage and UASB reactor effluent from the Sewage Treatment Station was carried out. Tests with UASB type reactor effluentts were carried out on a bench scale (flotatest) where $FeCl_3$ dosages (0, 50 and 100 mg L^{-1}) and flotation speeds (5, 8 and 15 cm min^{-1}) were tested in DAF, and the $FeCl_3$ dosages (0, 50 and 100 mg L^{-1}) and sedimentation time (30, 45 and 60 minutes) in the sedimentation through the factorial design of experiments, with total phosphorus, soluble phosphorus, total chemical oxygen demand (COD), soluble chemical oxygen demand and turbidity. The $FeCl_3$ 100 mg L^{-1} dosage was more effective in the two types of post-treatment, with removal efficiencies of total and soluble phosphorus: 87.8% and 92% in DAF and 90.2% and 92% in sedimentation, respectively. The post-treatment tests by dissolved air flotation and sedimentation without the use of FeCl3 do not show good results in removing the studied parameters. The interference of FeCl3 measurements in the removal of the studied parameters is more important than the interference of surface application rates. Both technologies presented excellent performance.

Keywords: post-treatment of sewage, physical-chemical treatment, phosphorus, COD, turbidity.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

PANORAMA DO USO DE SIMULAÇÃO DO DESEMPENHO DE EDIFICAÇÕES EM METODOLOGIAS DE ZONEAMENTO CLIMÁTICO

* Franklin Puker de Sousa [1]
Tássio Luiz dos Santos [1]
Arthur Santos Silva [1]

OVERVIEW ABOUT THE USE OF BUILDING PERFORMANCE SIMULATION IN CLIMATIC ZONING METHODOLOGIES

Recibido el 30 de abril de 2020. Aceptado el 12 de abril de 2021

Abstract

Several countries are subject to climatic zoning to verify the level of energy efficiency of their buildings, however, there is not still consensus in the literature on the most appropriate methodology to build it. Among the possible techniques, the building performance simulation is a tool with great potential for the definition and validation of climatic zones, however, little is known about the results of its application. For this reason, this article aimed, through a systematic review of the literature, to compile and analyze studies on the use of simulation in climatic zoning methodologies. When analyzing the climatic zoning of 64 nations, it was found that in only 7 the simulation was, in some way, considered in the development of the climatic zoning. Regarding the application modes, simulation is often used to define and validate climatic zones in conjunction with other procedures. Morocco and Spain are the only representatives in which the climatic zoning and the current energy efficiency regulations were defined based on the results of building performance simulation, indicating that the tool is still little explored for this purpose.

Keywords: *climatic zoning, building energy efficiency, building performance simulation.*

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6 de diciembre de 2021

REVISTA AIDIS
de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

PRODUÇÃO DE BIOSSÓLIDO AGRÍCOLA POR MEIO DA COMPOSTAGEM DE LODO DE ESGOTO

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* Davi Santiago Aquino [2]

PRODUCTION OF AGRICULTURAL BIOSOLID BY COMPOSTING SEWAGE SLUDGE

Recibido el 4 de mayo de 2020. Aceptado el 4 de junio de 2021

Abstract

Less than half of the Brazilian population has access to some type of domestic sewage collection and treatment. Sewage sludge is a costly and often neglected by-product of the effluent treatment processes, and its final disposal can be problematic. Composting is an option for sludge management and treatment, where the product (biosolid) can potentially be used in agriculture. The objective of this work was to verify the feasibility of composting sewage sludge from anaerobic ponds at Rio Verde, State of Goiás, Brazil, and to evaluate the efficiency of this technique in the production of biosolid. The open environment composting process lasted for 60 days, and the resulting compost showed 48% removal of organic matter, in addition to an improvement in its physical-chemical quality. However, the final concentration of thermotolerant coliforms was not in line with the requirements of Brazilian legislation, therefore requiring an hygienization additional step before agricultural use.

Keywords: *anaerobic pond, domestic sewage, stabilization.*

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de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

COMPOSTING OF SEIZED CIGARETTE TOBACCO AND INDUSTRIAL SEWAGE SLUDGE WITH SAWDUST OR GARDEN PRUNING

Thiago Eduardo de Almeida [1]
* Cleber Pinto da Silva [1]
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Daniel Ruiz Potma Gonçalves [2]
Sandro Xavier de Campos [1]

Recibido el 14 de mayo de 2020. Aceptado el 13 de abril de 2021

Abstract

The composting of seized cigarette tobacco (SCT) and industrial sewage sludge (ISS) mixed with sawdust or garden pruning was evaluated using physical-chemical, phytotoxic and spectroscopic parameters. The temperatures reached peaks above 55ºC in the five windrows and were sufficient to achieve the stability of the compounds. The moisture content remained mostly in the range of 50 to 70% indicated for efficient microbial activity during the decomposition process. The pH remained between 7.0 and 9.0, considered ideal for the stability of microorganisms that act in the various stages of composting. The loss of organic matter indicated an increase in the mineralization of the compost. After 180 days, the seed germination index (SGI) was above than 50% in the five windrows. The E_2/E_4, E_4/E_6 (UV-Vis) and 1650/2930 cm^{-1}, 1650/2850 cm^{-1} and 1650/1711 cm^{-1} (FTIR) ratios indicated the degradation of lignin, formation of aliphatic structures, oxygenated groups and aromatic carbon at different stages of maturation of the compounds. The windrow composting process was efficient to degrade different proportions of SCT and ISS, resulting in matured compounds.

Keywords: *industrial sewage sludge; seized cigarette tobacco; solid residues.*

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Investigación, desarrollo y práctica.

AVALIAÇÃO DA EFICIÊNCIA DE UMA ESTAÇÃO DE TRATAMENTO DE ESGOTO SANITÁRIO DE UM CAMPUS UNIVERSITÁRIO

* Denise Peresin [1]
Taison Anderson Bortolin [1]
Mayara Cechinatto [1]
Vania Elisabete Schneider [1]

UNIVERSITY CAMPUS WASTEWATER TREATMENT PLANT EFFICIENCY EVALUATION

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Abstract

The rotating biological contactor (RBC) system for the treatment of effluents follows the same theoretical principle of aerobic systems and presents very competitive characteristics when compared to other technologies. The objective of this study was to evaluate the efficiency of the compact wastewater treatment plant from a university, that employs the RBC technology, as well as the stages of the system, through statistical analysis and comparison with the limits of the applicable legislation. Samples for the analysis, were collected every two weeks, between the years 2012 and 2015, in 4 points. The results were evaluated by the statistical tests of Shapiro-Wilk, Mann-Whitney and t-student, and compared with the emission or minimum efficiency standards defined by normative resolution Consema nº 355/2017. The wastewater treatment plant (WTP) was efficient in removing coliform (>95%) and met the concentration limits determined by the resolution for the parameters pH, BOD_5, COD and TSS. In summary, the study pointed out that the major problem of WTP is the removal of nutrients, which are above the values determined by the resolution. It was evidenced that the current treatment system, needs to be increased, in order to become more efficient in the removal of these parameters.

Keywords: *WTP, biodiscs, nutrient removal.*

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CONCRETO A PARTIR DE AGREGADO GRAÚDO RECICLADO: UMA AVALIAÇÃO NA PRODUÇÃO DE BLOCOS INTERTRAVADOS EM FORTALEZA/CE

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CONCRETE FROM AGGREGATE GRADE RECYCLED: AN EVALUATION IN THE PRODUCTION OF INTERLOCKED BLOCKS IN FORTALEZA/CE

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Abstract

The urgency to develop configurations for the use of construction and demolition waste (RCD) is irrefutable, given that they are bulky, inert, and barely workable. Therefore, they represent difficulties in the destination and can trigger several environmental, social, health and economic problems. The study aims to evaluate the performance of pieces for interlocking pavements made with concrete whose natural coarse aggregates have been partially replaced by recycled ones. Methodologically, concrete production was used in three proportions of substitution of natural coarse aggregates for recycled ones: 0%; 25%; 50%, with concrete without adding recycled material used as a reference for the others. The water-cement factor was maintained in all proportions. To ensure workability, recycled aggregates were added to the concrete only after prior water compensation. The results indicated a 10.7% loss in the compressive strength parameter and a maximum increase of 46.7% in water absorption. Despite the reductions in the strength values of blocks with recycled material, the results obtained met the minimum limit of 35 Mpa, required by NBR 9781, 2013. In general, it can be concluded that the use of recycled coarse aggregates for the manufacture of concrete, within the analyzed properties, it is feasible if production control is respected.

Keywords: *concrete, construction and demolition waste, recycling.*

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MINIMIZAÇÃO DE RESÍDUOS SÓLIDOS DOMICILIARES: ESTUDO DE CASO EM CONDOMÍNIO VERTICAL NA CIDADE DE JOÃO PESSOA-PB

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MINIMIZATION OF THE GENERATION OF SOLID HOUSEHOLD WASTE AND ITS DISPOSAL IN LANDFILLS: CASE STUDY IN VERTICAL CONDOMINIUM IN THE CITY OF JOÃO PESSOA-PB

Recibido el 21 de mayo de 2020. Aceptado el 27 de julio de 2021

Abstract

This research consists of an analysis of the impact of minimization strategies on the generation of household solid waste (HSW) and the flow to be disposed of in landfills in a residential building located in the city of João Pessoa-PB. The per capita generation of the building's RSD and the gravimetric composition of the waste generated were determined and subsequently, reduction strategies were implemented in the building. The practices adopted were: selective collection, environmental awareness and home composting. To compare the averages of RSD generation in the building without intervention and after 70 days of the application of each strategy, analysis of variance was used according to the graphic method GT-2, with a significance level of 5%. The results show that the building's per capita RSD generation rate, calculated before applying the strategies, was 0.490 kg/inhab.day, and most of this waste is made up of organic matter (58.42%); recyclable materials represent 26.59% of the RSD. After the adoption of selective collection, environmental awareness and composting in the building, the amount of RSD sent to the landfill was 0.346 kg/inhab.day, 0.329 kg/inhab.day, and 0.327 kg/inhab.day, respectively. Therefore, a final reduction of 33.26% was observed in the waste sent to the landfill in the absence of strategies in the building. With the analysis of variance it was possible to observe that with the implementation of the minimization strategies there was a significant reduction in the per capita generation rate of the building's RSD that are effectively destined to the landfill.

Keywords: *composting, environmental awareness, household solid waste, reduction, selective collect.*

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MEMBRANE BIOREACTOR APPLIED TO THE TREATMENT OF A FRUIT PROCESSING INDUSTRY WASTEWATER IN NORTHEAST BRAZIL

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Abstract

The market for Membrane Bioreactors (MBR) technology has recently grown due to increasingly strict standards for effluent discharge and the need for alternative water sources. The high quality of the effluent produced, enabling the possibility of reuse is one of the most attractive characteristics of this technology. The objective of this article was to evaluate the treatment efficiency of a pilot-scale MBR plant in a fruit processing industry, including an analysis of the possibilities for effluent reuse. The pilot plant comprised a MBR with approximately 5000L in capacity, with porous type ultrafiltration grade polyethersulfone membranes. Other details for the membranes were: submerged configuration, flat plate type geometry, pore diameter ranging from 0.035 to 0.1 µm and total area of 25m². The industrial effluent came from fruits processing, floors and machinery washing, and was characterized by physical, chemical and bacteriological parameters. Results showed that permeability decreased about 50% during the monitoring, indicating the need of membrane cleaning. The removal efficiency for COD, BOD_5, total nitrogen and total phosphorus, was 97.1%, 98.7%; 95.7 % and 53.5%, respectively. There was an absence of both total coliform and E. Coli at the inlet and outlet of the system. The permeate fits into agricultural, urban, environmental, industrial and aquaculture reuse modalities.

Keywords: *industrial effluents, mbr, reuse, water scarcity, ultrafiltration.*

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THE USE OF ELECTRIC BOATS AND PHOTOVOLTAIC ENERGY AS A GOOD PRACTICE FOR REGIONAL SUSTAINABLE DEVELOPMENT

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Abstract

Transportation dynamics are essential for the economic development of the urbanisation process. It also interferes the social distribution pattern and the environmental features of urban areas. Either along inland waterways or coastlines, boats might represent a massive source of clean technology, depending on their source of energy and functional specifications. The electric motor for boats joins the range of propulsion supply of new driving components within the context of electric mobility. The option of feeding it with renewable energy resources meets several actions that have been reviewed: new wetted materials, the use of fossil fuels and mostly the emission of CO_2. Given the assumptions listed, the present study was guided by the use of electric energy produced by photovoltaic cells with favourable results in electric motors. The experimental tests showed that the electric motor could be activated only by photovoltaic panels or have the battery loaded from solar panels. In all the situations the boat movement was similar to the combustion motor. The minimisation of the environmental impact was approached by withdrawing the fossil fuel engines, and the results also corroborated the economic and social use of these boats for transportation, small-scale fishing, sports and sightseeing, representing the blueprint that urban areas intend to achieve in line with the Sustainable Development Goals of the 2030 Agenda.

Keywords: *Agenda, regional development, renewable energy, sustainability, transportation modes.*

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REVISTA AIDIS

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AVALIAÇÃO DO PERFIL ESPACIAL E POTENCIAL ENERGÉTICO DO METANO DISSOLVIDO EM REATOR UASB OPERANDO EM ESCALA PLENA

* Fernanda Janaína Oliveira Gomes da Costa [1]
Bárbara Zanicotti Leite Ross [1]
André Luiz de Faria [1]

EVALUATION OF THE SPATIAL PROFILE AND ENERGY POTENTIAL OF DISSOLVED METHANE IN FULL-SCALE UASB REACTOR

Recibido el 28 de mayo de 2020. Aceptado el 19 de octubre de 2020

Abstract

The anaerobic reactors, such as UASB reactors, are widely used in Brazil and require adequate management of sludge, scum and biogas that are the by-products of UASB. A portion of the gases generated in anaerobic treatment may remain dissolved in the liquid. The present work aimed to evaluate the content and energy potential of dissolved methane in the effluent of a full scale UASB reactor, along the height of the reactor. the results obtained allowed to conclude that the dissolved methane concentration inside the reactor is variable and increases with the effluent sampling depth, the determined average concentration of 11.04 ± 1.93 mg / L at the top of the reactor and 13.93 ± 1.32 mg / L at the bottom of the reactor . Furthermore, the standart deviations between experimental and simulation results of dissolved methane in the effluent are 50%. The energy from biogas and dissolved methane recovered from the UASB effluent is a feasible and sustainable alternative because it allows 553 homes to be supplied, or 34% of the ETE's energy needs to be met.

Keywords: *dissolved methane, energy potential, UASB reactor.*

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REVISTA AIDIS

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MEDIÇÕES DE GÁS SULFÍDRICO E METANO EM TAMPAS DE REATOR UASB TRATANDO ESGOTO DOMÉSTICO

* Fernanda Janaína Oliveira Gomes da Costa [1]
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Luiz Gustavo Wagner [1]

MEASURES OF SULPHYDRIC AND METHANE GAS IN UASB REACTOR COVERS TREATING DOMESTIC WASTEWATER

Recibido el 28 de mayo de 2020. Aceptado el 4 de junio de 2021

Abstract

In wastewater treatment plants (WWTP) gases are formed due to the operating conditions and processes adopted. In this context, fugitive emissions of gases in UASB reactors can occur mainly due to leakage in inspection caps, biogas line, cracks and micro-cracks in concrete. In order to evaluate the gas retention efficiency of UASB reactor caps and to guide the actions of mitigating bad odors, measurements of the concentration of hydrogen sulfide and methane gas were performed in two cover models used in reactors treating domestic wastewater. As a result the pressure closure device for retaining the glass fiber reinforced plastic (PRFV) cap, reached efficiency of 94.0% for CH_4 and 96.9% for H_2S. Already the iron caps promoted the tightness of the gas chamber in the reactor, being identified only a fugitive emission point in one of the caps where there is the need to adjust the closure (adjustment in the anchorage of the screws).

Keywords: *UASB, hydrogen sulfide, methane gas, caps.*

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Investigación, desarrollo y práctica.

AVALIAÇÃO DA FREQUÊNCIA DE REVOLVIMENTOS SOBRE A ACELERAÇÃO DA COMPOSTAGEM REALIZADA EM TAMBORES

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EVALUATION OF THE FREQUENCY OF TURNING IN THE ACCELERATION ON THE BIOSTABILIZATION OF COMPOSTING HELD ON DRUMS

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Abstract

Composting is a method of recycling the organic waste which has a low cost compared to other existing technologies, mainly when carried out near its generating source. In urban centers, generators generally do not have the area to compost, making it challenging to adopt. A faster-composting process can reduce the space required. Among several factors, oxygen is essential to achieve the maturation of the organic compost. In this context, the present study was planned to investigate three different frequencies of turning the mass of organic waste in the composting acceleration, occurring in plastic drums. Food residues mixed with leaves and tree pruning were used. During the process, the attributes temperature, humidity, pH, and electrical conductivity were monitored. Thirty days after the experiment's beginning, nutrients content and the germination percentage of lettuce and arugula were analyzed. During the monitoring, the temperature did not exceed 60ºC, and humidity remained high, condensing water in the drums, which may be the reason for the low temperature. Through the nutrient content and C/N ratio, it can be confirmed that the material was not yet matured. It was concluded that the frequencies of turning tested did not interfere in the acceleration of composting. The germination percentage was high only for arugula, while for lettuce, it was lower, showing some degree of phytotoxicity. Thus, the organic compost at this stage would not be recommended for food crops and can only be used for planting perennial crops and tree pits in parks, gardens, and reforestation projects.

Keywords: *acceleration, biowaste, closed container, recycling.*

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REVISTA AIDIS

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EDUCAÇÃO AMBIENTAL ATRÁVES DA DESTINAÇÃO AMBIENTALMENTE CORRETA DO ÓLEO VEGETAL APLICADA AOS COMECIANTES DO BAIRRO DA PEDREIRA EM BELÉM DO PARÁ NO BRASIL

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ENVIRONMENTAL EDUCATION THROUGH THE ENVIRONMENTALLY CORRECT DESTINATION OF VEGETABLE OIL APPLIED TO TRADERS IN THE NEIGHBORHOOD OF PEDREIRA IN BELÉM DO PARÁ IN BRAZIL

Recibido el 4 de junio de 2020. Aceptado el 13 de enero de 2021

Abstract

The present work seeks to carry out a survey of information about the traders' knowledge regarding the handling and disposal of vegetable oil, showing the importance of environmentally correct disposal and an alternative for reuse, in addition to promoting environmental education with the interviewees. This study was carried out through data collection in the field, at the Pedreira Supply Complex in the city of Belém, capital of the state of Pará, located in the north of Brazil, with the application of a questionnaire to twelve food traders, regarding forms of disposal, reuse, disposal, and knowledge of the environmental damage caused by inadequate disposal and the perception of the collection of this waste by companies. The results obtained showed that 58% donated the oil and the rest of the traders performed the inappropriate disposal. All responded that they are unaware of the damage caused by the environmentally inappropriate disposal of vegetable oil. Those who are unaware of the reuse and destination of used vegetable oil correspond to 75%, and 83% do not know companies in the city of Belém that collect this vegetable oil. Therefore, there is a need to implement permanent and continuous educational programs for traders in the neighborhood of Pedreira, Belém do Pará, as these professionals were not aware of how to properly handle vegetable oil, how to properly dispose of it and how to reuse the waste. Therefore, it can be inferred that environmental education points out proposals centered on awareness, reuse and environmentally correct disposal not only of vegetable oil, but also of other solid residues, promoting sustainability and reducing the environmental impact.

Keywords: education, environmental preservation, public health, solid waste.

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ANÁLISIS COMPARATIVO EN LA IMPLEMENTACIÓN DE MATRICES PARA PRIORIZACIÓN DE RIESGOS EN EL MUNICIPIO DE PEREIRA, COLOMBIA

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COMPARATIVE ANALYSIS IN THE IMPLEMENTATION OF MATRICES FOR THE RISK PRIORITIZATION IN THE MUNICIPALITY OF PEREIRA, COLOMBIA

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Abstract

The present work is framed in the methods and techniques of disaster risk assessment and management used in various territorial contexts to understand the social, natural and socio-natural processes that determine the risk of the occurrence of a disaster. This work aims to apply the methodologies of the Oregon Emergency Management of the United States of America and the National Civil Protection Authority of Portugal for the prioritization of risk at the local level, taking as a case study the municipality of Pereira, Colombia. To achieve the defined objective, a review of the DesInventar (international) and VISOR (national) emergencies and disasters databases was performed, these databases with information available for the study area, thus, the main types of events recorded in the period of 93 years (1926-2019) were identified. Finally, with the application of the mentioned methodologies, the priorities for risk intervention in the municipality under study were defined. The priority risks in the municipality of Pereira and their order of prioritization (from the highest priority to the least priority) are mass movements, floods, earthquakes and strong winds.

Keywords: *Colombia, natural and socionatural hazards, risk assessment, risk characterization, risk matrices.*

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MODELO DE REGRESSÃO LINEAR MÚLTIPLA PARA PREVISÃO DE RECALQUES EM ATERROS SANITÁRIOS DE PEQUENO PORTE

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MULTIPLE LINEAR REGRESSION MODEL FOR SETTLEMENTS PREVISION IN SMALL SCALE SANITARY LANDFILLS

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Abstract

Municipal Solid Waste (MSW) compressibility studies are important to maintain the stability of the landfill and ensure the integrity of the solid mass. Additionally, the settlement prevision helps in planning the operation of the landfill. It allows the extension of its useful life. In this theme, this article presents the development of multiple linear regression models in order to estimate settlements for these areas of final disposal of solid urban waste. Likewise, the variables used in the model were chosen considering the model's applicability in the landfill operation routine. A small scale sanitary lanfill inatalled in Presidente Lucena city (Southern Brazil), was designed, built, and monitored for 441 days. This assessment included measurements of vertical displacements in surface landmarks, physical, chemical, and biological monitoring of the leachate generated and analysis of data on climatic conditions in the region. The model presented settlement as a dependent variable and the COD and volatile suspended solids concentrations of the leachate as the independent variables. The adjusted R^2 was 0.698; considering a 95% confidence level ($p < 0.05$). The regression model showed a variance of 0.000446m and a standard deviation of 0.00326m.

Keywords: *MSW, municipal solid waste compressibility, settlement model, multiple linear regression model, small scale sanitary landfills.*

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DESENVOLVIMENTO DE UM SISTEMA DE INFORMAÇÃO PARA A PLATAFORMA DESKTOP VISANDO O DELINEAMENTO DE ÁREAS VERDES URBANAS EM ESCALAS MUNICIPAIS

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André Luis Gobbi Primo [1]
Luciana Rezende Alves de Oliveira [1]
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DEVELOPMENT OF AN INFORMATION SYSTEM FOR THE DESKTOP PLATFORM FOR THE DESIGN OF URBAN GREEN AREAS ON MUNICIPAL SCALES

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Abstract

Planned urban green areas stand out in their ability to mitigate climatic issues by reducing thermal amplitudes, improving air quality, protection of soil against erosion, protection of wind forces, refuge of fauna and the expansion of biodiversity. The objective of the work reported here was the development of a software, entitled Desktop Information System for Delineation of Urban Arborization - SISARB, for the desktop platform with the purpose of granting information from the municipal census, using the JAVA programming language with the framework NetBeans and modeling using the UML markup language. The image used in SISARB needs high definition with at least 70 Dots Per Inch - DPI and be taken at times that the sun provides good illumination of the region. This software identifies the various shades of the green color of the RGB table that characterizes the wooded regions and the amount of green present and missing. The quantification of green areas was calculated as a percentage. All green areas found after image processing were colored pink. The software has a single user; first select the high-resolution image; after the image is displayed the percentage is defined as 0 to 100%; after defining the percentage, the software is asked to check the green areas of the inserted image. This software was developed for municipal scale and allows the user with minimal knowledge in computing to use it for a specific, direct and precise purpose.

Keywords: *environment, urban green áreas, software, tree census mall scale sanitary landfills.*

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REVISTA AIDIS
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ANÁLISE SOBRE OS IMPACTOS AMBIENTAIS DO PROGRAMA DE COLETA SELETIVA DO MUNICÍPIO DE JOÃO PESSOA - PB/BRASIL

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ANALYSIS OF THE ENVIRONMENTAL IMPACTS OF THE SELECTIVE COLLECTION PROGRAM IN THE MUNICIPALITY OF JOÃO PESSOA - PB/BRAZIL

Recibido el 20 de julio de 2020. Aceptado el 12 de abril de 2021

Abstract

Municipal solid waste (MSW) has a significant potential to generate environmental impacts. Depending on how the management steps are performed, waste can cause impacts through gaseous, liquid and solid emissions in the various stages of the process. This study aims to evaluate the life cycle of the selective collection program of the MSW to identify possible environmental impacts resulting from the implementation of this system in the municipality of João Pessoa - PB. Primary and secondary data were collected from a ten-year period and the Life Cycle Assessment (LCA) was used. The software used was SimaPro 8.0.1 and the methodology developed was CML-IA baseline version 3.00/World 2000. The categories evaluated were: eutrophication; acidification; photochemical oxidation; global warming; ozone layer depletion and human toxicity. During this period, it was observed that the selective collection program contributed to the reduction of several emissions of pollutants into the atmosphere. The acidification category had negative emission in all years evaluated. Eutrophication only showed negative emission in 2015, considering that this year the quantitative collected by recycling were higher than the other years. However, for the categories photochemical oxidation, global warming, ozone layer depletion and human toxicity, the reductions in pollutant emissions at the recycling stage were not sufficient so that these categories did not generate impacts. Thus, for greater reductions in emissions, mechanisms should be sought to optimize the selective collection program of the municipality, increasing recycling, in addition to implementing the reuse of gases produced in the landfill.

Keywords: *life cycle assessment, environmental pollution, solid waste, recycling.*

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REVISTA AIDIS

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PRODUÇÃO E APLICAÇÃO DE CARVÃO ATIVADO DE LODO BIOLÓGICO: INFLUÊNCIA DO COT E DAS SUBSTÂNCIAS HÚMICAS NA POROSIDADE

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PRODUCTION AND APPLICATION OF ACTIVATED CARBON FROM BIO-SLUDGE: TOC AND HUMIC SUBSTANCES INFLUENCE IN POROSITY

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Abstract

The bio-sludge carbonaceous matrix provides an expectation that adsorbents can be produced from the residue. The objective of this study was to analyze the organic matter influence on the porosity of activated carbons produced from textile (LT) and recycled paper (LP) industries bio-sludge and evaluate its applicability through methylene blue (MB) adsorption. The activated carbons were denominated LTA and LPA. The bio-sludge organic matter was analyzed by determining the total organic carbon (TOC), fulvic acids (FA) and humic acids (HA). LP presented TOC 9.77%, FA 4.12% and HA 2.07%. LT presented higher levels of the parameters: TOC 31.25%, FA 12.64% and HA 3.21%. As obtained by the infrared spectroscopy analysis, LT and LP presented oxygenated surface groups, however, LT presented a greater amount of the groups. Thus, the higher amount of oxygenated groups on the surface of LT is related to the material's higher FA content. The LTA presented higher iodine number (959 mgI_2/g) than LPA (234 mgI_2/g). The results indicate that the organic matter content relates to the porosity development, being that higher levels of TOC and FA resulted in a better-developed pores. From the adsorption experimental equilibrium data, it was observed that LTA was more effective in removing MB than LPA. The chemical properties of the materials influenced the adsorptive behavior, however, the surface area contributed more decisively to the adsorption capacity.

Keywords: *biological sludge, activated carbon, organic matter, humic substances, adsorption.*

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CONHECIMENTO E APLICAÇÃO DE ESTRATÉGIAS SUSTENTÁVEIS E DA NORMA DE DESEMPENHO (NBR 15.575/2013) PARA EDIFICAÇÕES POR PROFISSIONAIS DA CONSTRUÇÃO CIVIL

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KNOWLEDGE AND IMPLEMENTATION OF SUSTAINABLE STRATEGIES AND THE PERFORMANCE STANDARD (NBR 15575/2013) FOR BUILDINGS USING CONSTRUCTION PROFESSIONALS

Recibido el 21 de junio de 2020. Aceptado el 13 de enero de 2021

Abstract

Civil construction is a sector of significant importance for economic and social development, but it is also one that has the greatest impacts on the environment. The application of sustainable solutions can minimize the consumption of natural resources such as water, energy, and materials. However, the application of sustainability concepts depends on the technical knowledge and value perception of construction professionals. Accordingly, this study diagnoses the technical knowledge of civil construction professionals in the southern region of Ceará from the standpoint of sustainable strategies and the requirements of the Performance Standard for Residential Housing (NBR 15575/2013) that are essential for sustainability improvements. The key results indicate that the professionals have little depth of knowledge related to sustainable solutions and no experience in terms of practical application to projects or work. Most of the interviewees recognize the importance of the performance standard for generating opportunities and adding value to the services provided; however, they highlight difficulties such as insufficient professional training and outdated undergraduate courses.

Keywords: *sustainable buildings, performance standards, professional training.*

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DESCARTE DE ESMALTES DE UNHA REALIZADO POR MANICURES NA REGIÃO METROPOLITANA DE BELÉM, PARÁ

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DISPOSAL OF NAIL ENAMELS CARRIED OUT BY MANICURES IN THE METROPOLITAN REGION OF BELÉM, PARÁ

Recibido el 30 de junio de 2020. Aceptado el 6 de mayo de 2021

Abstract

Nail polishes from the manicure service offered in beauty salons have an impact on the environment caused their chemical composition and Irregular Disposal (ID). The objective of this study was to identify the form of discarded of nail polish made by manicure in the Metropolitan Region of Belém (MRB), state of Pará. The character of this research was bibliographic, exploratory and descriptive. A study area composed of five of the seven municipalities that make up the MRB: Ananindeua, Belém, Benevides, Marituba and Santa Izabel of Pará. A sample of 58 manicurists. A data collection carried out in May to June 2020, was applied a virtual questionnaire with nine open and closed questions, using information about the manicure's workplace, the process of acquiring and discarding nail polish, among others. For data analysis, descriptive statistics were used for determination, frequencies and graphs. The results indicate that manicurists provide their services in the homes of customers, the criteria to purchase the nail polishes are the taste of customers, trends and brands. The enamel disposal is carried out with Household Solid Waste (HSW), and in most cases, the are enamel on the packaging. The HSW are destined to landfills, they do not undergo any type of treatment, segregation and identification. In terms of chemical composition, there is a need to mitigate environmental impacts caused by the enamel ID, being one of the ways of the industry of sustainable enamels - free enamels 9.

Keywords: *cosmetics industry, solid waste, health service.*

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REVISTA AIDIS

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EVALUACIÓN SISTEMÁTICA DE LA TECNOLOGÍA DE TRATAMIENTO FISICOQUÍMICO A BASE DE ZEOLITAS DE LAS AGUAS RESIDUALES GENERADAS POR EL RASTRO TIF DE VILLAHERMOSA TABASCO

Zonia Cárdenas-Garza [1]
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SYSTEMATIC EVALUATION OF THE PHYSICOCHEMICAL TREATMENT TECHNOLOGY BASED ON ZEOLITES FOR THE WASTEWATER GENERATED BY THE FEDERAL INSPECTION TYPE SLAUGHTERHOUSE OF VILLAHERMOSA TABASCO

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Abstract

In Mexico, wastewater treatment projects from municipal slaughterhouses are of great interest, since they allow reusing contaminated water in their own facilities and ensure proper reincorporation into drainage and public sewers, they also contribute to reduce the water footprint of the country. To achieve the success of these projects, it is necessary to evaluate all the available options from a sustainable approach, and thus be able to select the most appropriate technology. This paper presents a systematic evaluation to identify if a physicochemical technology based on zeolites, selected by the builder, is the best option for the wastewater treatment of the new Federal Inspection Type slaughterhouse of Villahermosa Tabasco, or on the contrary, if a biological technology proposed by us would be more adequate. To develop this study the slaughterhouse wastewater characteristics and the applicable normativity were considered, which in this case is the Norma Oficial Mexicana (NOM) from Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT), named NOM-002-SEMARNAT-1996, which establishes the maximum permissible limits for pollutants of wastewater discharges to urban or municipal sewer systems. The comparison between both technologies was developed by the application of the methodology described in the book "Selection of technologies for municipal wastewater treatment", from the authors Noyola et al. (2013). Our results indicate that the biological proposal would be more sustainable than the physicochemical option based on zeolites.

Keywords: *activated sludge, municipal slaughterhouse, wastewater treatment plant, UASB zeolites.*

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REVISTA AIDIS

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ANÁLISIS CUANTITATIVO DE LOS INCENDIOS OCURRIDOS ENTRE 2006 Y 2017 EN LA SUB-CUENCA DEL RÍO ITACAIUNAS, MARABA, PARA, BRASIL

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QUANTITATIVE ANALYSIS OF FIRES BETWEEN 2006 AND 2017 IN THE ITACAIUNAS RIVER SUB BASIN, MARABÁ, PARÁ, BRAZIL

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Abstract

Flammability in forests in the Brazilian Amazon, especially in the southern and southeastern regions of the state of Pará, is high. Therefore, the objective of this study was the survey of data on fires that occurred in the sub-basin of the Itacaiunas River between 2006 and 2017. The method used was deductive, with quantitative and qualitative coverage, and nature applied. The data analyzed were obtained from freely accessible sites involved with the focus of these studies, such as the Ministry of the Environment, the National Institute of Space Research, the Brazilian Amazon Forest Monitoring Program, and the Burned Database. The analysis of the data obtained for the period under investigation indicated that in the sub-basin of the Itacaiunas River, the municipality of Marabá presented high indices (n = 4.122; 41.4%), Eldorado dos Carajás introduced a lower index (n = 1.583; 15.9%). In the case of Marabá, the growing timber extraction is one of the reasons for this amount of burning. The lowest index of all was registered in Sapucaia (n = 128; 1.3%), which has vegetable extraction, hunting, and fishing as its economy. Therefore, the fires in these regions are associated with the economic aspects developed by them, so they need new information more frequently from further academic studies, always based on the comparative content of previous research to verify their alleviation or reduction.

Keywords: *cutting and burning, georeferencing, land use and occupation.*

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REVISTA AIDIS

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RELAÇÃO ENTRE PRODUÇÃO DE RESÍDUOS SÓLIDOS URBANOS E CRESCIMENTO POPULACIONAL NA REGIÃO NORTE

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RELATIONSHIP BETWEEN PRODUCTION OF URBAN SOLID WASTE AND POPULATION GROWTH IN THE NORTH REGION OF BRAZIL

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Abstract

The objective of this research was to quantitatively analyze the relationship between: population growth, production and final disposal of solid waste in a time frame between 2008 and 2017, in the northern region of Brazil. The deductive method was applied with quantitative and qualitative scope, observational nature, with exploratory procedure. Secondary data collection was carried out by accessing the free data platform off the Panorama off Solid Waste in Brazil published by the Brazilian Association off Public Cleaning and Special Waste Companies – ABRELPE. The generation of solid waste from 2008 to 2017 increased by 75.3% and population growth by 8.4%. In the period from 2008 to 2012, the production of solid waste had the highest percentages (54.2%), but the population growth was equivalent to 7.7%. The data also indicated, regarding the final disposal, that there was an increase, between 2008 and 2017, of 5.4% off the waste sent to landfills, and 1.4% for the open dumps. There was also a 6.8% decrease in waste disposed in controlled landfills in the same period. The state of Pará has lower rates of production per capita off solid urban waste (22.2%), which is still inadequately disposed of (71.8%). Thus, the statistical analysis of these variables is essential to make urban development compatible with environmental quality when proposing measures that mitigate or minimize the impacts arising from the increasing production of solid urban waste - MSW.

Keywords: *disposal, solid waste generation, pollution.*

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Investigación, desarrollo y práctica.

AVALIAÇÃO DE ESTAÇÃO DE TRATAMENTO DE EFLUENTES COM FOCO EM MELHORIA DA QUALIDADE DA ÁGUA DE REUSO: ESTUDO DE CASO EM UMA INDÚSTRIA FARMACÊUTICA

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EVALUATION OF A WASTEWATER TREATMENT PLANT FOCUSING ON THE IMPROVEMENT OF REUSE WATER QUALITY: A CASE STUDY IN A PHARMACEUTICAL INDUSTRY

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Abstract

This study aims to diagnose an existing effluent treatment and reuse water production system, located in a pharmaceutical industry, and to evaluate the quality of the treated effluent, as well as the reuse water, in order to promote and expand their use. The study was made based on the history of analyzes of the treated effluent and the reuse water, already used in cooling and sanitary systems. The data were organized and related to the normative and technical standards regarding the applications of reuse water. The characterization of the samples was evaluated in relation to the current use and the possible scenarios of expansion of the reuse, using statistical tools. The results show that only disinfection is a process that needs improvement, compared to current use. With improvements in the disinfection system and adherence to the monitoring of parameters recommended in legislation, the applications of reuse water can be expanded and, with investment in advanced tertiary treatment technologies, the parameters of reuse water can approach potability standards. Opportunities for improvements were detected in the cooling water system, in which reuse water is applied, and the possibility of using reuse water in boilers, with the potential for annual savings in the order of R $ 300,000.00 / year.

Keywords: *water reuse, wastewater treatment, reuse standards.*

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BASIC SANITATION IN THE MUNICIPALITY OF CACOAL (RO) MULTI-ANNUAL PLAN, AN EVALUATION USING CLUSTER ANALYSIS

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Andressa Vaz Oliveira [1]
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Abstract

Due to the import role civil society plays in public management, the Multi-Annual Plan (MAP) is a management tool, indicated in the Federal Constitution, to plan and structure public actions. Considering that, this study aimed to identify the greatest demands of the 2018-2021 Multi-Annual Plan in the municipality of Cacoal, state of Rondônia, Brazil so that it could distinguish the regional similarities among the demands. The information was taken from the city hall website and tabulated in the Microsoft Excel program. To identify the similarity between the regions analyzed, data were organized according to the hierarchical clustering method using Statistica software. Initially, the elements were distributed according to their own pattern and, gradually, all the groupings created were intertwined in a single group, containing all the data. The results show that the major demands of the municipality are, in priority order, 1 – infrastructure improvements, 2 – creation of spaces for education, 3 – expansion of basic sanitation.

Keywords: *urban planning, similarity-based hierarchical clustering analysis, water resource management.*

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REVISTA AIDIS

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VISÃO GERAL SOBRE AS TECNOLOGIAS SUSTENTÁVEIS DO SANEAMENTO RURAL NO TRATAMENTO DE ESGOTOS SANITÁRIOS NO BRASIL ENTRE 2008 E 2018

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OVERVIEW ON SUSTAINABLE RURAL SANITATION TECHNOLOGIES IN THE TREATMENT OF SANITARY WASTE IN BRAZIL BETWEEN 2008 AND 2018

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Abstract

The sustainable technologies for the proper treatment of domestic sewer can be used as alternative ways for rural populations or sporadic communities where there is no community sewage system, but the use of individual sanitation solutions is possible. The methodology used was exploratory and documentary seeking information on the subject in databases of periodic, thesis bank and dissertations. The purpose of this is to show some sustainable alternatives to avoid the gross sewer from being released directly into the receiving water body. As a result, 52 studies were found, in all, the alternatives meet what is proposed, and may highlight the wetlands method, which besides being the most studied technology, and 32.69% of the works were about this technology, it is economically more viable and implantation can add value to property and services.

Keywords: *biodigester sump, dry toilet, green sump, surface runoff, wetland.*

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MODELING OF THE LIMIT VALUE FOR REMOVING PARAMETERS BY CONSTRUCTED WETLANDS

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Abstract

This paper refers to the study of the efficiency of the constructed wetlands in the wastewater treatment, via mathematical modeling. The propose is to determine the stabilization limit value of removal of some parameters: Chemical Oxygen Demand (COD), Ammoniacal Nitrogen and Conductivity. The research considered a constructed wetland system, in an experimental scale, with different hydraulic retention time (HRT) for domestic wastewater treatment: 0, 2, 4, 6 and 8 days. The data were collected, analyzed and the results indicated, according to the Ford-Walford method, the removal stabilization limit values were, approximately, 90% for COD, 74% for Ammoniacal Nitrogen and 41% for Conductivity. According to the model, the hydraulic retention time to reach these removal indexes were 4 days for Ammoniacal Nitrogen and Conductivity and 10 days for COD. The evaluated parameters have demonstrated to be sensitive to the biological wastewater treatments by constructed wetland, the model made it possible to determine the limit values and the stabilization time and the hydraulic retention time has showed an important factor of the management of such systems, that must be monitored, in order to optimize the parameters removal and the efficiency of the treatment.

Keywords: *efficiency of a constructed wetland, hydraulic retention time, stabilization limit value.*

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