



Vol. 1, No. 1, 2006
ISSN 0718-378X

REVISTA AIDIS

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

Abstracts

Vol. 1, No. 1

Con el patrocinio de:



ABSTRACTS**Vol. 1, No. 1, 2006****GESTÃO INTEGRADA DE RESÍDUOS SÓLIDOS
16 ANOS DE EXPERIÊNCIA – O CASO DE PORTO ALEGRE**

Campani, D. B. & Reichert, G. A.

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Porto Alegre –RS – Brasil campani@ufrgs.br**Abstract**

Integrated management of solid wastes – 16 years of experience in the city of Porto Alegre. In 1989, the prefecture of Porto Alegre, city of about 1.4 million inhabitants and capital of the southernmost state of Brazil, starts implementing a new approach to solid waste management, which later constituted the Program of Integrated Management of Solid Wastes. The program was organized based upon a survey on wastes, involving its origin, amount and specific composition. Then, a management system was projected to maximize the reuse of wastes, seeking social inclusion of the population of waste gatherers. In July 7, 1990, selective gathering in the city was started. Initially only in one neighborhood, nowadays it covers almost the entire city and with about 60% of the dwellers participating in the program. In this project, waste gatherers were involved through associations, which are currently more than 10 and are organized in a statewide organization and nationally articulated. The organic matter recycling also initiated at this time, where food wastes were destined to animal feeding. Later, a processing and composting unit entered into operation, allowing the reuse of a certain amount of organic matter. Areas that had been degraded by non-proper waste deposits were ameliorated and sanitary landfills were constructed and operated following environmental regulations. In this paper, statistical data will be presented from this 16-year experience in Porto Alegre city, demonstrating that a prefecture may in fact accomplish solid waste management, provided that the whole process is properly planned and human resources qualified.

**DIAGNÓSTICO E AVALIAÇÃO DOS SERVIÇOS DE LIMPEZA URBANA
POR INDICADORES E ÍNDICES NO ESTADO DE MATO GROSSO DO SUL**

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Abstract

This work has as objectives to diagnosis and to evaluate the performance of the municipal solid wastes systems of the Mato Grosso do Sul State, through the search of data regarding its sanitary, operational, economic, financial efficiency and of the possibility of induction of environmental unbalances, and of the use of indicators and of IQESLU (Index of Quality and Efficiency of the municipal solid wastes systems), developed by the Universidade Federal do Rio Grande do Sul, through the Sector of Environmental Sanitation of the Instituto de Pesquisas Hidráulicas. They had been raised given of 74 municipal solid wastes systems for attainment of the 13 sub-indexes, in order to obtain the description of the current scenery, of the 74 evaluated cities, in relation to the urban solid residues generated by the population. The IQESLU's calculated had presented an equal average 53.56%, being that 37.84% of these cities had presented IQESLU below of the average and 62.16% had presented IQESLU above the gotten average. Greater presented IQESLU was of 70,89%, and minor IQESLU it was of 36,80%. The results showed the necessity to improve the management in the different stages of all municipal solid wastes systems of this State, in order to reduce the possibility of negative environmental impacts.

Key words: solid wastes, municipal wastes systems, index of quality.

DISPOSICIÓN FINAL DE ACUERDO A LA NOM-083-SEMARNAT-2003

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Abstract

In Mexico the landfills, represents an option both economic and ecologically viable for the final disposal of the urban solid waste (USW), from there that to achieve the better operation of these sites, is necessary to assure the fulfillment of the Mexican Official Norm (MON): NOM-083-SEMARNAT-2003 that refers to the specifications of environmental protection during the phases of selection, design operation and closure of a site. The present work proposes the use of environmental indices based on the specifications that establishes the norm to evaluate the sites of final disposal (SFD) closed or active, based on the Multiple Attributes Decisions Theory as theoretical base and the conception of two mathematical models, for conform the model of evaluation; this model permits to qualify the SFD in a form efficient and numerical scale to detect the infringement of the norm in the sites and then to apply the norm. The Indices of Evaluation of SFD (IESFD) are excellent tool that will permit to take decisions for the fulfillment of the norm.

Keywords: Urban solid waste; Sanitary landfill; Final disposal; Environmental indices.

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Abstract

The improvement or design of a solid waste management system in any locality should be based on the knowledge of the solid waste characteristics, such as generation per capita, density and composition; depending on the type of treatment that is going to be projected to those wastes. Therefore, a solid waste characterization study in a selected number of households is required. The selected households should represent the population universe. The statistical methodology applied in the solid waste characterization studies in Latin America and the Caribbean countries was designed by Dr. Kunitoshi Sakurai in 1982. The procedures we present below are intended to reinforce that methodology, incorporating statistical analyses to validate both the number of the samples and the data collected during the households sampling.

Palabras clave: Caracterización, Composición, Densidad, Generación per cápita, Muestra, Estadística.

ACTIVIDADES DEL SECTOR INFORMAL – OBSTÁCULOS Y EJEMPLOS PARA SU INTEGRACIÓN EN LA GESTIÓN MUNICIPAL DE RESIDUOS SÓLIDOS

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Abstract

The informal sector within solid waste management shows many aspects and denominations. Pепенadores, catadores, cirujas, gancheros and buzos are only some of the names given to waste picker in Latin America. They found a productive niche in solid waste classification. They are part of the solid waste management system: Hundreds of thousands collect, classify and sell material and thereby generate an income. On the other hand, the informal sector returns considerable quantities of material to productive processes and support to preserve natural resources towards a cycle management. Nevertheless, often they work under dangerous conditions to health and the environment and against the formal solid waste management the local authorities realise. This paper describes the cases of the informal sector in Rosario, Argentine, Cairo in Egypt and current trends in Brazil.

Key words: Informal sector, Waste picker, Pепенadotes, Recycling, Cycle management, Solid waste management

LINEAMIENTOS DE LA POLÍTICA EN MATERIA DE RESIDUOS SÓLIDOS MUNICIPALES. EMPRESAS COMUNITARIAS PARA EL MANEJO

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Abstract

To solve the several problems caused from the deficient solid waste management in many of our municipalities, must be considered 4 substantial items: planning, legislation, the most citizen participation and the financing aspect. Failing in any of those subjects is to conduce to serious problems as increasing rates of non coverage on waste collection, or on the raise of illegal dumping into de cities, in example. At present, too many alternatives in technologies, to solve any of the solid waste control's stage, are proposed to municipalities and central governments as the best with no previous feasibility analyzes. This has become in economical

looses because of fraud or inexperienced governmental agents allied with unmoral salesman. This article is to propose, mainly, the creation of communitarian enterprises to operate the solid wastes system, throw the improvement of society's collaboration and involvement into the public services as the main performer in solutions. This is to oppose to the wrong politics that have been generalized and implanted, from certain governmental areas, in order to privatize the public services without studying alternatives that could be better to a society. Of course, to have successful experiences it should be necessary to know the different characteristics of each community or city. In this way, to implant a communitarian enterprise would be helpful the knowledge of the feasibilities on economical, social and environmental items.

Palabras Clave: Empresa. Comunitaria. Operación. Residuos. Servicios. Privatización.

GESTIÓN LOCAL DE RESIDUOS SÓLIDOS: EL SISTEMA NACIONAL DE CERTIFICACIÓN AMBIENTAL DE ESTABLECIMIENTOS EDUCACIONALES UNA ESTRATEGIA DE INTEGRACIÓN ESCUELA COMUNIDAD

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Abstract

Both in Chile and in other countries, managing municipal solid waste (MSW) is a difficult problem, due to the various variables explaining it. Several background data suggest that the possibilities of solving the problem are associated to the education and environmental training of the population, as well as to an increase in their citizen participation. Having education intervene in these variables would be a proper way to proactively address the problem and minimize the present negative environmental impact brought about by inefficient or non existent managing plans.

In our country the National System of Environmental Certification for Educational Entities (SNCAE) has been created, which is a proposal by the National Environment Committee (CONAMA), the Ministry of Education (MINEDUC), UNESCO, the National Forestry Corporation (CONAF), the Sustainable Development Council, and the City Councils Association. It is a way of accepting the challenge of promoting a cultural change towards sustainability. SNCAE is a framework for action from which strategies can be derived, such that integration and participation of the local community in environmental management of MSW are promoted from school on.

Universidad de La Serena, in the 4th Region of Chile, and the Regional Council of Environmental Certification, have signed a collaboration agreement. Under that agreement, the Interdisciplinary Program of Environment and Development Education (PRIEMAD), belonging to the University, has developed a set of actions so that educational entities both in rural and urban communities in the 4th Region successfully participate in the SNCAE. Training Courses for teachers in directing positions and instructors, courses on Community Environmental Education, and technical assistance for schools have been provided. A new methodology has been developed to include topics related to both MSW and natural and socio-cultural resources in the curriculum. This is complemented with procedures for including environmental standards in the fields of School Management and Environmental Relationships. In the latter, both the acquisition of knowledge and the development of positive attitudes and abilities for MSW management are promoted.

The knowledge and experience that derives from this can be extended to other realities, both urban and rural, in Chile or other countries.

Keywords: Environmental Education, Community Environmental Education, Waste minimisation, Sustainable waste management, Chile.

LA FACTIBILIDAD TÉCNICA, AMBIENTAL Y ECONÓMICA DE LA SEPARACIÓN Y UTILIZACIÓN DE LOS RESIDUOS SÓLIDOS COMO RECURSO A GRAN ESCALA EN EL ÁREA METROPOLITANA DE BUENOS AIRES

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Abstract

The purpose of this work is to evaluate the feasibility to separate a fraction of urban solid waste of the Buenos Aires Metropolitan Area, where 13.000 tons of wastes per day are generated, in order to consider its value and transform it into resources that can be used as raw materials for a new productive process. In other words, the aim is to change the way the waste is currently managed, which is mainly unidirectional (collection to final disposal only) towards an integral management that incorporates both Separation and Recycling Plants. The average values for each component from the solid waste with the potential for its commercialization were determined from the 2002 study database of the characterization and quantification of waste components from Buenos Aires City. The obtained results allowed the economic and financial evaluation of the construction and operation of a Waste Separation Plant that uses local technology and would be located in a Final Disposal Center. Different scenarios for the separation, recovery, commercialization potential and transport of the recovered material were simulated. For all analyzed cases, the conclusions demonstrate that the proposal is technically feasible, environmentally sustainable and economically viable.

PLAN DE GESTIÓN INTEGRAL DE RESIDUOS HOSPITALARIOS Y SIMILARES (PGIRHS)

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Abstract

The Environmental Management System (EGS), was constituted at the University of Antioquia in order to improve the environmental conditions, health and well being levels of the community; promoting the efficient use of resources, involving cultural changes in consume patterns, knowledge of treatment wastes and final disposition. In that way the reduction in wastes generation will constitute a priority plan that involve clean production systems and protocols, following the environmental legal dispositions. We show the evolution of the program designed for the EGS related with waste management at the U de A.

Key words: Waste, waste management, recycling, education, cultural changes.

REHABILITACIÓN DE SUELO CONTAMINADO CON HIDROCARBUROS MEDIANTE LA APLICACIÓN DE LODOS

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Abstract

Hydrocarbon spill are de main sources soil contamination, and most of their components are hard to degrade. Microorganisms can use hydrocarbons for their growth as the sole carbon source.

The hydrocarbon removal efficiency was evaluated by laboratory tests. Sludge from a refinery wastewater treatment plant from hydrocarbon plant were added and mixed with the soil. The sludge acclimatization was first test by addition substrate, nutriment and hydrocarbon into biological reactor. Biomass produced by the reactor was added in 9

experimental boxes with contaminated soil. Boxes had 3 different treatments; the first treatment was sludge application, the second test was application of sludge and nutrients and the last test was application of sludge and non-ionic surfactant. Results show a diesel hydrocarbon removal for 4 week of the application of sludge and surfactant. Removal efficiencies from 67 to 73 percent were obtained

CAMBIO EN LAS PROPIEDADES FÍSICAS DE UN SUELO CONTAMINADO CON HIDROCARBUROS DEBIDO A LA APLICACIÓN DE UNA TECNOLOGÍA DE REMEDIACIÓN

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Abstract

The application of remediation technologies may produce changes in the soil physical properties, and these changes may have an influence on its productivity. To address this issue, in this work it was selected a site contaminated by gasoline that was remediated through the application of bioremediation and air sparging. The site was located in the community of San Agustín Tlaxco, Puebla.

To evaluate the changes in the physical properties of the soil due to the application of the remediation technologies, two areas were used. One area was a blank area, and it was located upstream where the contamination took place, and was not affected by the gasoline spill or the remediation technology. The other area was the treated area, and this was affected by the gasoline spill as well as by the remediation technologies (bioremediation and air sparging).

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Soil samples were collected from both sites at three different depths. Bulk density, real density, texture and porosity were measured. A statistical analysis was carried out in order to establish differences on the values measured. Results indicated significative changes on the soil physical properties measured in both sites.

Key words: soil, physical properties, hydrocarbons, changes, remediation

**OBTENCIÓN DE NIVELES DE REMEDIACIÓN DE SUELO APLICANDO UNA EVALUACIÓN
DE RIESGO ECOLÓGICO EN UN SITIO CONTAMINADO POR HIDROCARBUROS
Y METALES EN CD. MADERO, TAMAULIPAS**

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Abstract

An ecological risk assessment (ERA) was performed on a site contaminated by hydrocarbons to evaluate the potential harms to wildlife. The site was located in Ciudad Madero, Tamaulipas, Mexico and the assessment targets were the terrestrial organisms found at the place (8 mammal species and 13 bird species). The Hazard Quotient (HQ) method was applied, considering only the ingestion route of exposure. The information gathered during the assessment was used to obtain transfer factors that made possible to calculate protective soil concentrations which are expected to protect the health of the organisms evaluated. The contaminants considered for the assessment were the 16 PAHs (Polycyclic Aromatic Hydrocarbons) belonging to the priority pollutants as defined by the U.S.EPA (United States Environmental Protection Agency), BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes), as well as 8 metals (Aluminum, Cadmium, Chromium, Iron, Nickel, Lead, Vanadium, and Zinc). The results indicated risk only in the case of lead, and this was for three species of birds; this is the information presented in this work.

Key words: ecological risk assessment, hydrocarbons, metals, birds, mammals, Mexico.

**GESTIÓN DE RESIDUOS QUÍMICOS EN EL INSTITUTO DE QUÍMICA
DE LA UNIVERSIDAD DE SÃO PAULO**

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Palabras Claves: Gestión de residuos, Recuperación de disolventes, Residuos peligrosos

Abstract

This work describes the actions taken since the beginning of our Chemical Waste Management Program: i) identification of the main types of residues; ii) quantification of the residues already existing; iii) inventory of the reagents and solvents stored and iv) outfit of a laboratory for chemical residues treatment (CTRQD). In CTRQD both heavy metal solutions and organic solvents were treated. Since 2003, we processed almost 5.000 Kg of about 10 types of solvents using batch distillation. Some of these solvents were recovered from mixtures: HPLC was recovered from acetonitrile/water mixtures, n-hexane and dichloromethane were recovered from dichloromethane/n-hexane mixtures and hexanes were recovered from hexanes/ethyl acetate mixtures after ester hydrolysis with KOH using phase transfer catalysis. Organic solvents were also recovered from liquid scintillation wastes. It was also established the feasibility of reusing solid KOH, dryers and phase transfer catalysts. Other solvents could be recovered by washing with aqueous HCl.

**NIVELES DE SANEAMIENTO PARA SUELO CON PASIVOS AMBIENTALES.
ESTIMACIÓN DE FACTORES DE EXPOSICIÓN PARA MÉXICO**

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Abstract

A central topic concerned with soil restorations actions is to get a confidence approach on the exposure risks levels that need to be controlled through the reduction or minimization of the concentrations of contaminant of interest. This study presents the characterization of most relevant exposure variables for Mexican people under potential risk of exposure at sites contaminated with hazardous wastes, in order to achieve more certainty on risk estimation. Data from an epidemiologic survey conducted at 11 rural Mexican communities, were used to develop empirical distribution functions to address the variability and diversity on temporal exposure variables and the body weight and height characteristics of the population of concern. The variability and uncertainty analysis of the Mexican values shows great divergence with the typical values based on the mean values for the American population. It is an evidence of the advantage of this initial approach to the variability of the most relevant exposure variables for countries like Mexico. As an example, the distribution function for exposure duration is used to develop soil cleanup levels at exposure scenario of soil contaminated with benzene by the application of probabilistic risk assessment and iterative truncation method.

Palabras clave: factores de exposición, niveles de limpieza, estimación de riesgo probabilístico, saneamiento de suelo, benceno.

VARIACIÓN DE LA EFICIENCIA DE LA BIORRESTAURACIÓN CON PASTOS, A DIFERENTES PROFUNDIDADES DE LA RIZÓSFERA, PARA SUELOS CONTAMINADOS CON DIESEL

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Abstract

In this work we studied the degradation of diesel at different depths, in the presence of grass roots. The process is compared to natural attenuation. The capacity of the vegetal species to tolerate the pollutant and the factibility of its application in a process of phytoremediation, were studied.

Grass seeds were grown in soil polluted with approximately 10,000 and 20,000 ppm diesel (dry basis). Samples of soil were analyzed in triplicates, at three depths (10-15 cm, 20-25 cm and 30-35 cm) during four months. It was observed that the degradation of diesel diminished as the depth of soil increased, because it is conditioned by the generation and depth of the roots. These roots showed less biomass in function of depth, within the experimental times. The efficiencies in the soil contaminated with 10,000 ppm diesel, at different depths, were 79.4%, 77% and 67.3%, respectively. For the soil contaminated with 20,000 ppm diesel, were 77.4%, 66.2% and 36.6%, correspondingly. In natural attenuation a degradation of 30% and a volatilization within 37 and 39%, were observed.

Palabras Clave: biorrestauración, rizósfera, suelos, pastos, diesel.

FERTILIZACIÓN DOSIFICADA CON BIOSÓLIDOS ACONDICIONADOS

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Abstract

This research evaluates the advantages of applying stabilized biosolids -mixed with zeolites (clinoptilolite) and phosphoric rock- in soil. Biosolids, stabilized and pressed, were obtained from the Waste Water Treatment Plant Toluca Norte. The assessment was performed by

growing lettuce (*Lactuca. Sativa* var. *Intybacea Hort*) in soils with and without biosolids. Three different types of experimental conditions were tested: A) plain soil with low nutrients content, B) plain soil with low nutrients content improved with biosolids and C) rich, high nutrients content soil. Main properties of soils and biosolids were analyzed prior and after the experiments. In soils amended with biosolids, amount of biosolids was calculated based on N content and requirements. After the experiment, results were assessed in terms of biomass of lettuce produced for each experimental condition.

The best biomass results were obtained for rich soil (140g/plant), followed closely by soil amended with biosolids (120 g/plant). Poor soil, used as a control, presented a yield of 80 g biomass/plant. It is clear that addition of biosolids improve the quality of the soil, and subsequently, its capacity to support plant growth.

Palabras Clave: biosólidos, fertilización, zeolitas.

NITRACIÓN ÁCIDA (HNO₃-H₂SO₄) DEL TRICLOROBENCENO COMO PRETRATAMIENTO PARA SU GESTIÓN

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Abstract

In this investigation the nitration of trichlorobenzene was evaluated using “mixed acid”, with the purpose of observing the effects of four different combinations in the reaction yield. The combinations used were: HNO₃[67%]/H₂SO₄[97%], HNO₃[67%]/H₂SO₄[97%]+SO₃[20%], HNO₃[90%]/H₂SO₄[97%], HNO₃[90%]/H₂SO₄[97%]+SO₃[20%], the experiments were made in room temperature and using times of reactions of one, two and three hours for each mixture. From the results obtained in GC-MS it was observed that HNO₃[90%]/H₂SO₄[97%] and HNO₃[90%]/H₂SO₄[97%]+SO₃[20%] both at one hour of reaction, achieved the mononitration of all the reagent, having the second one the main advantage that the handling of the H₂SO₄[97%] is less risky than the H₂SO₄[97%]+SO₃[20%]. On the other hand, the nitration with HNO₃[90%]/H₂SO₄[97%]+SO₃[20%] at three hours of reaction generates a greater production of dinitrated trichlorobenzene.

Key words: Dielectric fluids, Trichlorobenzenes; Nitration; Mixed acid.

SÍNTESIS DE NITRO-DERIVADOS A PARTIR DE BIFENILOS POLICLORADOS PRESENTES EN ACEITES DIELECTRICOS UTILIZANDO MEZCLA ÁCIDA

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Abstract

In this study a method is developed to prepare saltpeter-derived of dielectric oils with PCBs using "mixed acid" with the objective of using them as amino-derived for industrial used and/or degradation by biological methods. The nitration of the dielectric oil was carried out using HNO₃[90%] and combinations of "mixed acid" in relationships: HNO₃[67%]/H₂SO₄[97%], HNO₃[67%]/H₂SO₄[oleum], HNO₃[90%]/H₂SO₄[oleum], HNO₃[90%]/H₂SO₄[97%] the time of reaction went from two hours to ambient temperature. The analyses carried out in IR to the nitration-oils evidence the presence of the group NO₂-incorporate to the molecule of PCBs. The mass chromatogram of these samples present the synthesis of new compounds. The presence of a bigger number of compound was observed with the nitration relationship HNO₃[90%]/H₂SO₄[oleum].

Keyword: Dielectric oils, Polychlorinated biphenyls, Mixed acid, Nitration.

REUSO DE RESIDUOS DE LA INDUSTRIA METAL-MECÁNICA PARA EL TRATAMIENTO DE EFLUENTES QUE CONTIENEN CONTAMINANTES REDUCIBLES

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Abstract

Metal mechanical industry produces annually tons of waste composed mainly of iron shavings. This research evaluates the feasibility of using those iron shavings for reduction of Cr(VI) in wastewater. Analysis of shavings showed they were composed essentially of iron (>90% peso), with other metal at trace levels. Leaching tests were performed to verify the shavings do not release toxic components in contact with wastewater. Finally, the shavings were used to reduce Cr(VI); 95% of Cr(VI) was reduced in solutions containing initial levels of 100-300 mg/L. Reduction is not strongly affected by presence of carbonate, sulphides, chloride and organic

compounds. This is a very attractive process, which uses a common waste to reduce water pollution in a cost-effective way.

Palabras clave: cromo hexavalente, virutas de hierro, reducción

EL CRECIMIENTO DE LOS RESÍDUOS DE APARATOS ELÉCTRICOS Y ELECTRÓNICOS FUERA DE USO: EL IMPACTO AMBIENTAL QUE REPRESENTAN

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Abstract

This paper intends to explain the problems that it supposes Waste Electrical and Electronic Equipments (WEEE), as well as to know developed countries positions, which are adopting different strategies to approach the problem decidedly.

Nowadays it was estimating that the growth of the volume of these residues is near three times higher than the average of other municipal waste: of the order of 3 % to 5 % per year.

From an environmental point of view the WEEE, they present the following problems:

- Unsustainable consumption of the natural resources,
- Contains harmful substances as the lead, mercury, cadmium etc.
- Its fast increase contribute in an important way to landfills saturation and pollution
- Difficult recycling.

The lack of management policies and environmental awareness about WEEE represents a threat to sustainable development. By this, it is necessary urgent measurements to know and to face the problem.

Key words: electrical and electronic equipments, waste management, harmful substances, technological waste.

MANEJO Y DISPOSICIÓN DE RESIDUOS SÓLIDOS DE MANEJO ESPECIAL GENERADOS DURANTE UNA CONTINGENCIA AMBIENTAL

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Abstract

During a hazardous situation caused by the chaos of a well of terrestrial drilling, a large quantity of semisolid wastes was generated (sludges). To determine its classification they were analyzed in agreement marks it the regulatory nature, the presence of hydrocarbons was sought. Nevertheless, the results show that is a matter of solid wastes of special management (RSME).

Owing to the generated volume and impacted area, approximately 5 hectares, was necessary to withdraw the sludges and to reorganize the place, since is a matter of a marsh. Since the event occurred has been given monitoring to the actions of restoration undertaken. To the date the evaluation carried out throws an advance of the 85%, achieving that the activities fishing grounds they were resumed and the recovery of vegetable species. Thus same, the conditions were monitored of bioindicadores in the river located next impacted area.

MANEJO Y DISPOSICIÓN DE RESIDUOS SÓLIDOS DE MANEJO ESPECIAL GENERADOS DURANTE UNA CONTINGENCIA AMBIENTAL

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Abstract

During a hazardous situation caused by the chaos of a well of terrestrial drilling, a large quantity of semisolid wastes was generated (sludges). To determine its classification they were analyzed in agreement marks it the regulatory nature, the presence of hydrocarbons was sought. Nevertheless, the results show that is a matter of solid wastes of special management (RSME).

Owing to the generated volume and impacted area, approximately 5 hectares, was necessary to withdraw the sludges and to reorganize the place, since is a matter of a marsh. Since the event occurred has been given monitoring to the actions of restoration undertaken. To the date the evaluation carried out throws an advance of the 85%, achieving that the activities fishing grounds they were resumed and the recovery of vegetable species. Thus same, the conditions were monitored of bioindicadores in the river located next impacted area.

EFFECTO DE SUELOS EN LA DEGRADACIÓN ANAEROBIA DE RESIDUOS SÓLIDOS MUNICIPALES

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Abstract

Landfills might be regarded as a necessity, and it is foreseen that they will be still used in the short and long term. Landfilling is bound to remain, regardless of how conscientiously other strategies are practiced, such as recycling, reducing and reusing; there will always remain a fraction with no other alternative than landfilling. In Scotland (UK), landfilling managing strategies are changing to comply with the European Community Landfill Directive (1999). The new legislation prevents organic matter from being landfilled, and waste composition is anticipated to change. Therefore, it is urgent to investigate the effect of any other organic component in a landfill, for instance, the intermediate soil cover (ISC). We propose that the inclusion of soil as ISC in the municipal solid waste (MSW), allows for the establishment of an earlier anaerobic fermentation. Thus, the aim of this work was to test the effect of the inclusion of 20% of soil in the MSW anaerobic degradation performance parameters.

APROVECHAMIENTO DE LA COMPOSTA PARA LA OXIDACIÓN DE METANO

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Abstract

Methane is a greenhouse gas and wastes are among its main anthropogenic sources. Methane biological oxidation is a mechanism through natural systems and soils, especially those with high organic content, eliminate this gas. Mature compost can be a suitable substrate for methanotrophs, the micro organisms responsible of methane oxidation in soils; therefore, compost can be used as a cover layer in solid waste disposal sites in order to avoid methane emissions.

The aim of this work was to analyze the methane oxidation capacity of composts obtained from common organic wastes in Yucatan. Nine PVC columns were designed and constructed with a diameter of 20 cm and height of 90 cm. Groups of 3 columns were filled with different composts (municipal solid waste 1 and 2 -RM1, RM2- and green waste). Each group had 3 different compost heights: 20, 40 and 60 cm. A mixture of CH₄-CO₂ (70-30) gas was fed through the bottom of each column. Methane concentration was measured at the feeding point, inside the columns at every 10 cm, and at the top of the column. Prior to the experiment, the composts physical and chemical characteristics were determined, according to standard laboratory methods for composts. A GEM-500 gas analyzer was used for determining gas composition. Best results for methane oxidation were obtained in the height of 20 cm of RM1 compost. This column removed 100% of methane during all the experiment, nevertheless, due to poor gas flow rate control, results were not concluding, therefore, it is necessary to confirm these results controlling the gas injection efficiently.

Keywords: Methane, compost, bio oxidation, methanotrophs.

EQUILIBRIOS DE DISTRIBUCIÓN DE METALES PESADOS ENTRE LA FASE ACUOSA Y LA SUPERFICIE DE LODOS RESIDUALES, GENERADOS POR PLANTAS DE TRATAMIENTO AEROBIO PARA AGUAS NEGRAS.

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Abstract

Several sorption isotherms were performed in order to establish the distribution of three metals: Cadmium, Zinc and Nickel, between the aqueous phase and the solid surface of a residual sludge from a wastewater treatment plant, the principal aim of this research was to determine the sorption capacity and the minimal conditions needed to integrate the residual sludge in treatment systems for those effluents contaminated with high concentrations of heavy metals. The obtained data were adjusted with the Langmuir and Freundlich linear expressions, finding a better adjustment with the first one. The resulting affinity of the metals for the organic binder (biosorbent) follows the sequence: Cd > Zn > Ni. It was observed that the sorption capacity is directly related to the pH conditions, the biomass concentration and its activity and also to an initial metal concentration in the sludge due to an original source contamination.

Palabras Clave: Biosorción, Equilibrio de Distribución, Isotherma Langmuir, Isotherma Freundlich, Lodos Aerobios, Absorción Atómica.

CONTAMINACIÓN POR RESIDUOS SÓLIDOS EN EL POLO TURÍSTICO TARARÁ

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Abstract

The tourist zone with marine and beaches requires of a suitable solid waste management coming from the residents, yachts and marine debris. The Tarara littoral and their residential area are located in the East littoral of Havana City with 1500 meters of extension. Marine debris was coming from land-based sources during the sampling of 12 months. The rocky coast tract was the most polluted by marine debris with unlawful micro drains while the Marine Tarara -included the beach- was the less polluted. The combined analysis of the solid waste coming from the residents, yachts and marine debris showed that the combustible wastes represent 45% in weight, inert 31%, fermentable 16% and forest 8%. The fermentable contained low in the solid waste is associated to the low periods of the residents' permanency in the houses and yachts. The solid waste density was 100-120 kg.m⁻³ and it can be compacted with recollect-compactor equipments. The analysis of solid waste grain suggested the use of containers of 100 liters of capacity for the yachts solid waste and containers of 1000 liters for municipality solid waste and marine debris, while the low heating power found in the garbage

was 1850-1945 kcal.kg-1. The total garbage production at present in Tarara is 3.4 t.day-1 and 1.62 kg.inhabitant-1.day-1 of index of production. However, the solid waste production is projected in 9 t.day-1 belong to 3.2 t.day-1 of humid garbage and 5.8 t.day-1 of dry garbage. The proposal collection route will have 7 km of extension and it is smaller than the current collection route (10 km) because of the dead distances decrease with an important saving and the collection time reduction. The garbage differentiated collection in dry and humid garbage is discussed, as well as a solid waste integral management, included the recycle.

Key words: Pollution, beaches, solid waste, differentiated collection, management, recycle.

SANEAMIENTO DEL TIRADERO DE LA CIUDAD DE OAXACA DE JUÁREZ

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Abstract

Oaxaca City's dump is located at Villa of Zaachila Municipality, it has 17.08 has as area and began operating 24 years ago. It attends Metropolitan Zone of Oaxaca City and roughly receives 650 Ton/d of solid wastes. It looks the dump site is in a vulnerable geological zone due to fails and with social conflicts due to country houses around it, getting health people on risk . Because of this the Ecology State Institute of Oaxaca is thinking about close it. Here, a drain proposal is presented which is based on topography, geophysical and soil mechanics studies, laboratory analysis and monitoring works; to establish criteria and characteristics of necessary facilities to drain the dump and to close it or to use it as a sanitary landfill for some years more. Palabras Clave: Residuos sólidos, saneamiento, relleno sanitario

EMISIONES DE MERCURIO GASEOSO TOTAL EN SITIOS DE DISPOSICIÓN FINAL DE RESIDUOS SÓLIDOS MUNICIPALES EN LA ZONA METROPOLITANA DE LA CIUDAD DE MÉXICO

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Abstract

Mercury is a potentially toxic element which gas phase has a life between 0.5 to 2 years, this allows it to travel great distances and to pollute by dry deposition distant regions to its place of origin. Potential sources of gaseous mercury with little studies in Mexico are the final disposal sites (SDF) of urban wastes (RSM). It is well know that several devises with mercury are 2 discarded within the RSM that are disposed in the SDF, were the temperatures are enough high to volatilize the mercury.

To assess the total gaseous mercury contribution (TGM) by the SDF of RSM, five sites located in the Mexico City Metropolitan Area with different stages of operation were studied. Samples of landfill gas, leached and ambient air from the surroundings were taken to analyze its mercury content. The results they indicate that in this stage of the study it is not possible to be correlated the levels of emission with the stage operation, nevertheless is evidence of importance of these sites like steam sources of mercury to the atmosphere

Palabras clave: Mercurio Gaseoso Total, biogás, residuos sólidos municipales, disposición final, Ciudad de México.

DISPERSIÓN DE MATERIALES AEROTRANSPORTABLES VIABLES, EN EL ÁREA DE TRATAMIENTO Y DISPOSICIÓN FINAL DE RESIDUOS SÓLIDOS MUNICIPALES DE LA CD. DE MÉRIDA, YUCATÁN.

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Abstract

Solid waste managing and disposal systems can contribute to the dispersion of the microorganisms that colonize the waste which is found in diverse states of degradation. The presence and dispersion of bioaerosols from these sites is considered as a potential human health risk for workers and for surrounding communities. The aim of this work was to quantify

and to determine the dispersion of bioaerosols, in the area of recycling, composting and disposal of municipal solid waste of the City of Mérida, Yucatán, Mexico. After two preliminary surveys, 20 sampling points were selected, based on dominant wind direction. Samples were collected using a six stages Andersen. Nutritive agar and Dextrose and Potato agar were used for total counts and fungi quantification respectively. Sampling time was 30 seconds and the impactor was placed up to the breathable height (1.50 m). Maximum quantities of CFU/m³ were registered and geometric means were calculated for every sampling site. SURFER 8 software was employed in order to display the results on site. The composting plant had the highest quantification for the general count of bioaerosols and the quantification of fungi. The landfill was the area of highest amount for the bioaerosols quantification during the first sampling. The highest averages for both, bioaerosols and fungi were found in the composting plant during the second sampling. High percentages of microorganisms distributed in the 4, 5 and 6 strata of the Andersen were found at the points of highest generation of bioaerosols for every evaluated site. This implies the breathing of microorganisms from 2.1 to 0.65 µm of diameter.

The presence of bioaerosols in this study site was not overhead the values reported for similar places in other parts of the world. Nevertheless, periodical monitoring is recommended in order to avoid risks to workers of the site.

Keywords: bioaerosols, municipal solid waste, Andersen, fungi, composting, waste disposal.

SELECCIÓN PRIMARIA DE ZONAS PARA LA CONSTRUCCIÓN DE SITIOS DE DISPOSICIÓN FINAL DE RESIDUOS SÓLIDOS URBANOS Y DE MANEJO ESPECIAL CASO DE ESTUDIO: MUNICIPIOS DEL ESTADO DE MÉXICO

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Abstract

The model for the adequate selection of a site for final disposition of Solid Waste (SW) that is shown in this paper has been developed on basis of the set of restrictions established by the Mexican norm NOM-083-SEMARNAT-2003. Its objective is create a environmental planning

instrument to support the selection, in the first stage of study, about some adequate areas dedicated to construct final disposition sites for urban (SW) and special waste (industrial waste non-hazardous).

In this study is also analyzed each one of the elements that integrate the whole system of restrictions, the sources of information required and it is established criteria for classification of sites with basis of the Official Mexican Norm indicated. From this information is generated an application model that process the cartographic information in order to generate a GIS that allows to determine a set of areas that, in principle, not violating any restriction indicated in that norm, furthermore zones in which some restrictions appear and other ones where it is necessary to carry out more technical studies to determine its potential situation to be used as sites for SW final disposal. Also a case of application in the Valley of Toluca, México is shown.

Keywords: Landfill, Landfill Site Restrictions, Urban Solid Waste, Special Waste.

SIMULACION DE LIXIVIACION EN BASUREROS ACTIVOS

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Abstract

A method to estimate leachate patterns is presented, considering a waste disposal site life history. Although designed for closed landfill applications, the HELP (Hydrologic Evaluation of Landfill Performance) model was used in active waste disposal sites where its output is a good representation of leachate production. The methodology consists in discretizing the site in units which were individually analyzed; results obtained for each unit were combined considering its spatial and chronologic position. Model calibration was carried out with data

collected in the Merida, Yucatan, Mexico, waste disposal site, emplaced on a karstic aquifer with unlined bottom which allowed leachate percolation to the subsurface. The model produced leachate flows during the active life of the site matching field observations; that is to say, seasonal leachate flow fluctuations were produced whose magnitude decreases as the site grows dimensionally.

Key words. HELP, leachate, disposal sites, modeling.

ALTERNATIVA DE TRATAMIENTO DE LIXIVIADOS DE RELLENOS SANITARIOS EN PLANTAS DE AGUAS RESIDUALES URBANAS

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Abstract

In this study an alternative is presented for the disposal and treatment of leachates generated in stage IV of the Bordo Poniente Landfill. The alternative treatment involves facultative lagoons located in Texcoco Lake, which is 1.5 km from the site of leachate generation. Because such systems function with the help of algae, the growth and evolution of the microorganisms responsible for the treatment such as the algae *Microsistis* sp., *Merismopedia* sp., *Euglena* sp., *Scenedesmus* sp., *Chlorella* and *Diatomeas*, were tracked, as were levels of fecal coliform matter and heavy metals. The results show that it is viable to incorporate 10% leachate mixed with wastewater into facultative lagoons, and the result is a 71% removal efficiency of Biological Oxygen Demand (BOD). It was demonstrated that mixing stable leachates with young leachates increases the wastewater plant's removal efficiency by raising the level of organic material in the leachate-wastewater mixture. This was done through the treatment of 90 mg/L without altering the algal population.

EVALUACIÓN DEL POTENCIAL ENERGÉTICO DE LOS RELLENOS SANITARIOS

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Abstract

In this article are presented the efforts made in Mexico by the Electrical Research Institute for the power generation projects with biogas produced in the sanitary landfills, and sites of final disposition of municipal solid waste. It is emphasized the importance of factors that take part in the development of these projects, such as availability and potential use of the resource, environmental implications, and the institutional and legal frame in the matter. It makes reference to the development of this technology in Mexico and to the absence of plans and programs to stimulate the use of the technology. It remarks the necessity to put into effect laws and norms that prohibit and sanction the landfill emissions to the atmosphere, like obligation to stimulate the advantage of biogas for electrical generation. Other critical factors for the development of these projects are discussed, such as the financing and the regulatory and institutional frame. Is presented and described the first Power Station of Biogas in our country, constructed in Monterrey Nuevo León by the company Bionergía de Nuevo León it has a capacity of 7,4 MW.

Palabras Clave: Biogás, Rellenos, Bonos de Carbono, Central, Bioenergía.

PRODUCTIVIDAD DE BIOGÁS EN UN RELLENO SANITARIO CLAUSURADO
BIOGAS PRODUCTION IN A CLOSED-DOWN SANITARY LANDFILL

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Abstract

Because of the little nationwide diffusion of the production and integral advantage of biogas generated in the sanitary landfill, this paper presents a monitoring of the biogas generation in a landfill located in the Mexico City Metropolitan Zone during almost two years that it presented a production indicated volumetric of biogas of approximately 30 ms hper well with the content of methane of almost 50% and heat capacity was around 150 kW.3-1 The monitoring of landfill is important because it allows to have an inventory of the emissions inside and outside of the landfill knowing the amount and quality of biogas in the landfill, reducing the possibility of unpleasant smells (avoiding the poisoning caused by composed highly toxic compounds, like hydrogen sulfide) and reducing the possibilities of internal fire and explosions.

Keywords: Biogas, productivity, closed-down sanitary landfill.