



Casa abierta al tiempo

Universidad Autónoma Metropolitana

Azcapotzalco

Feasibility of UASB-septic tank for high strength municipal wastewater treatment in Mexico City

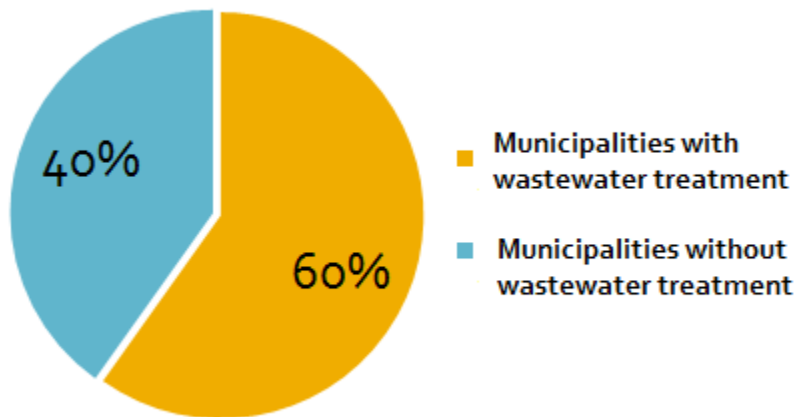
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Introduction

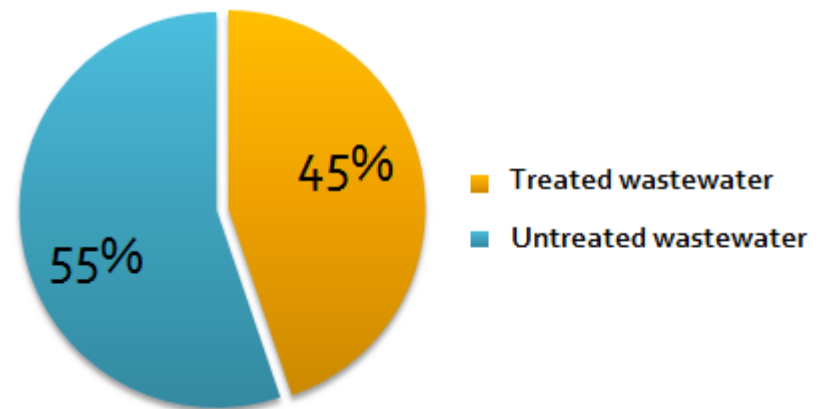
In Mexico, as in the rest of the world, water bodies are under a constant process of contamination by wastewater discharges

Percentage of municipalities with wastewater treatment



Total number of municipalities = 2,456

Percentage of treated wastewater



Total collected wastewater = 209.1 m³/s (90.5% of municipal wastewater generated)

Introduction

Decentralized wastewater treatment

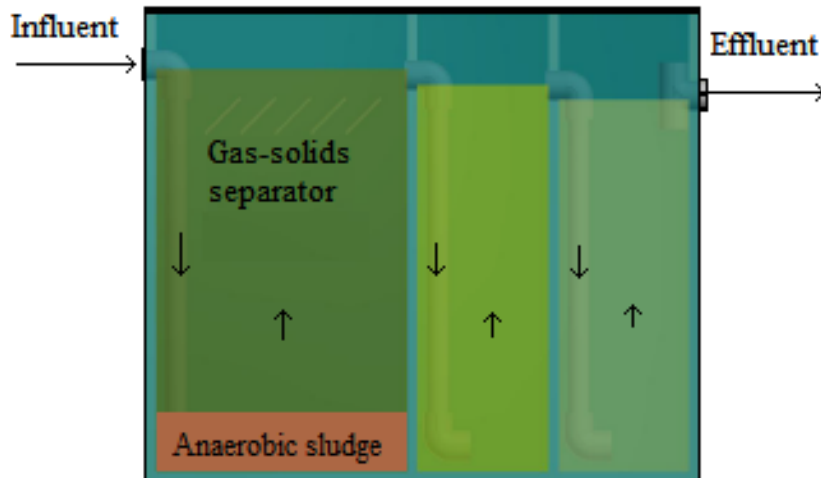
- Reliable, durable and low cost
- Low need for sophisticated control or maintenance
- Robustness, tolerance to fluctuations in concentration of organic matter
- Treatment for wastewater flows 1-500 m³ / day
- Can operate without power, permanent and continuous

Objective

The objective of this work was to assess the feasibility of an UASB-septic tank designed for the treatment of high strength municipal wastewater in Mexico City, as well as its performance during the start-up phase

Materials and methods.

Experimental set-up



A lab-scale UASB-septic tank (45 L volume, acrylic), consisting of three compartments treated high strength municipal wastewater from the Metropolitan Autonomous University - Azcapotzalco Campus.

The UASB-septic tank was maintained at ambient temperature ($16\text{ }^{\circ}\text{C}$ - $24\text{ }^{\circ}\text{C}$) and operated under 72 h HRT during three months.

Materials and methods.

Analytical methods

Parameter	Analysis Frequency	Method
pH	Three times per week	APHA (1998)
Dissolved oxygen	Three times per week	APHA (1998)
ORP	Three times per week	APHA (1998)
Temperature	Three times per week	APHA (1998)
Alkalinity	Twice per week	APHA (1998)
BOD ₅	Once per week	APHA (1998)
COD	Twice per week	APHA (1998)
TS, SS	Twice per week	APHA (1998)

Results.

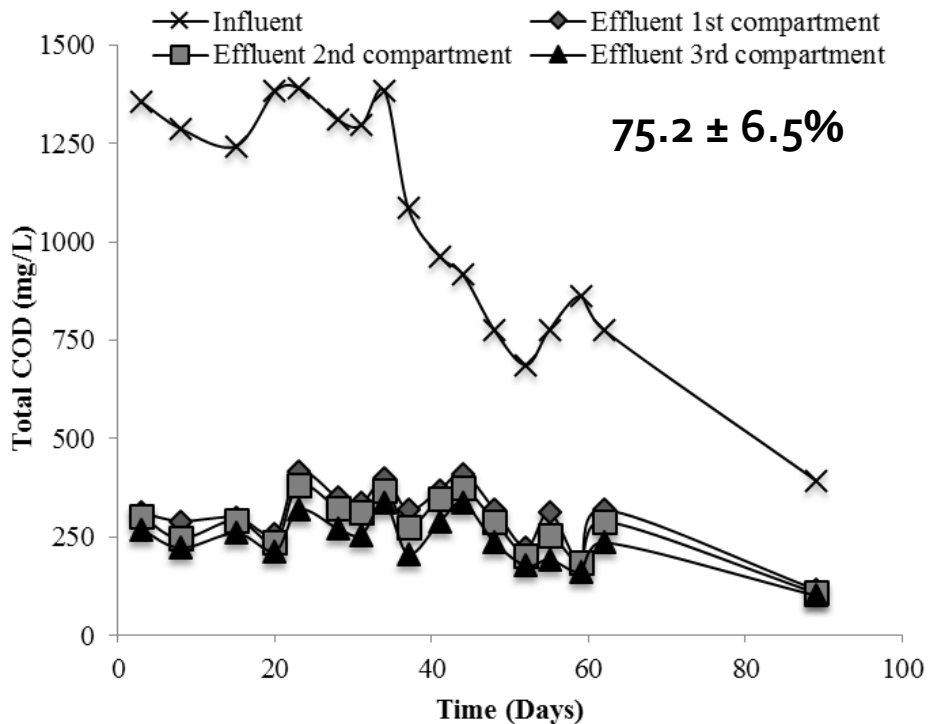
Physico-chemical parameters measured in the influent and in the effluent of each compartment

Parameter	Influent	1 st compartment effluent	2 nd compartment effluent	3 rd compartment effluent
pH	8.2±0.3	7.7±0.2	7.7±0.2	7.7±0.2
DO (mg/L)	0.1±0.1	0.1±0.1	0.1±0.1	0.1±0.1
Temperature (°C)	18.8±1.7	20.2±1.4	19.8±1.3	19.5±1.2
ORP (mv)	-153.2 ±39.5	-206.2 ±46.1	-218.7 ±49.2	-225.5 ±52.1
Alkalinity (mg/L CaCO ₃)	194±16	211±21	215±22	220±22

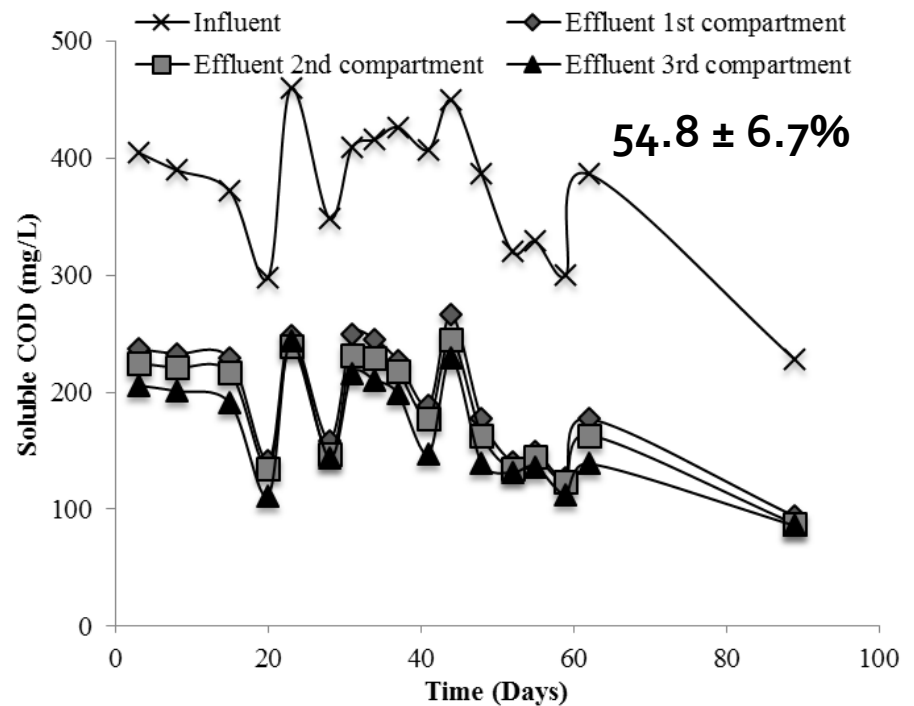
Results.

COD behavior

TOTAL COD



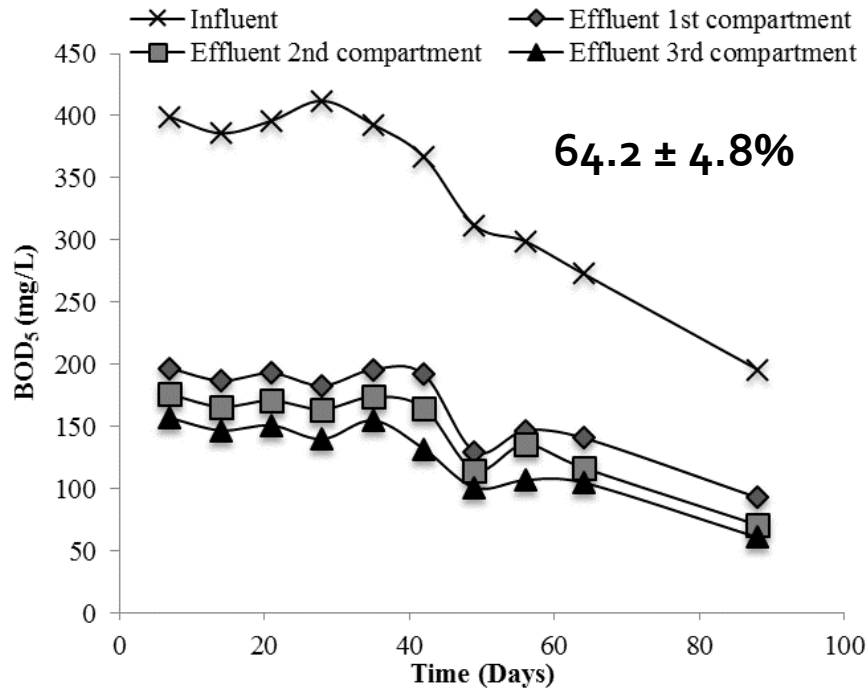
SOLUBLE COD



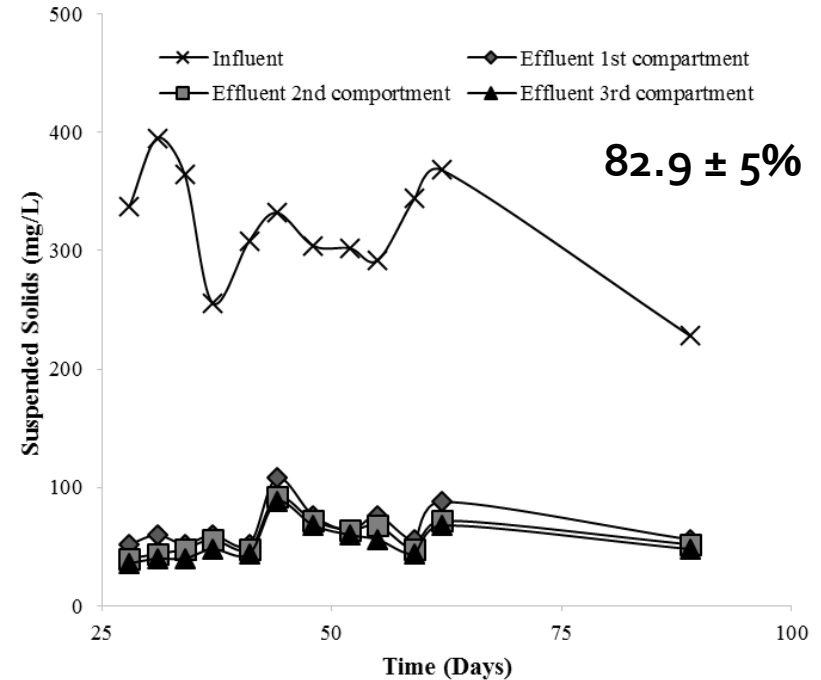
Results.

BOD₅ and SS behavior

TOTAL BOD₅

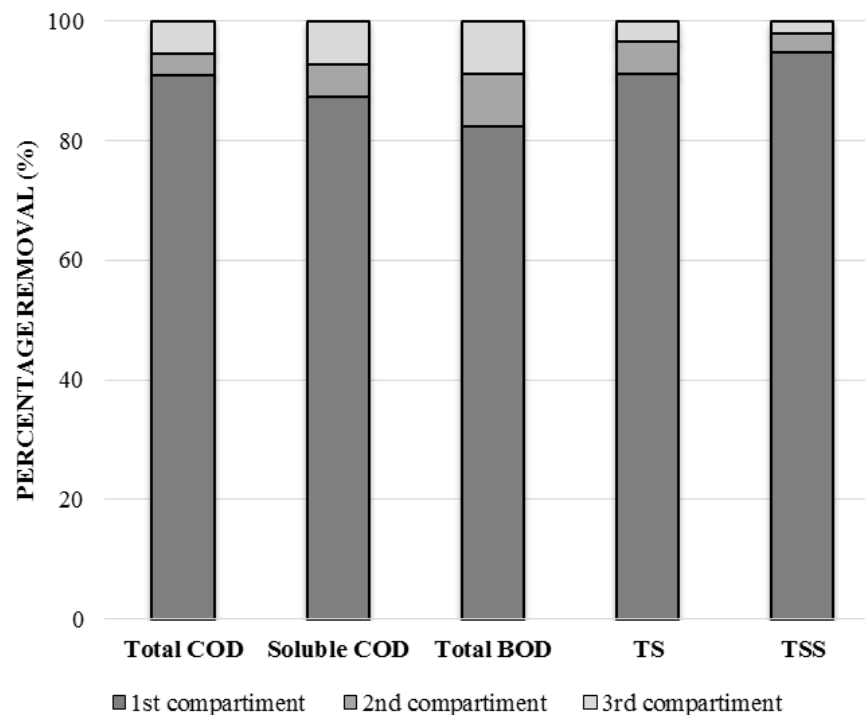


SUSPENDED SOLIDS



Results.

Performance of each compartment



Conclusions

- The proposed modifications improved significantly the UASB-septic tank performance regarding the conventional septic tank.
- Most of the organics and solids removal occurred in the first compartment (between 80 and 95%), while the other two served as polishing.
- According to the Mexican Official Standard NOM-001-SEMARNAT-1996, regarding BOD₅ and suspended solids concentrations, the UASB-septic tank effluent could be discharged into rivers and natural reservoirs used for irrigation and urban public use, in coastal waters used for recreation and fishing operations, in estuaries and in natural wetlands.
- The results obtained in this study demonstrated the feasibility of UASB septic tank system for treating wastewater in Mexico.