Amoxicillin removal using WTPS pellets as substrate for fixed bed adsorption.

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Figure 1: Pirajuçara urban stream

INTRODUCTION

Recent published monitoring results indicates amoxicillin and derivatives compounds prone to be found in sewage and sewage treatment effluents discharge. Their presence are also considered a indication of sewage contamination of surface water resources. The presence of those compounds in surface water can cause significant interference in the physiology, metabolism and behaviour of many species, mainly altering their immune organisms defences. The development of low cost adsorption processes can promote sewage and wastewater treatment before those compounds reaches the water resources. The use of an abundant and low cost solid residue of water treatment plant - WTPS as substrate modified with organophilic clay have been promoting the adsorption process to remove amoxicillin and derivatives from sewage and wastewater in competitive cost before water resources discharge.The surface treatment with bentonite clay was chosen accordingly with its purpose of surface adsorption of organic compound, the clay is traditionally used to clarify some comestible organic oil. (Freitas et al, 2013)(Ortiz, et al, 2001).

METHODS

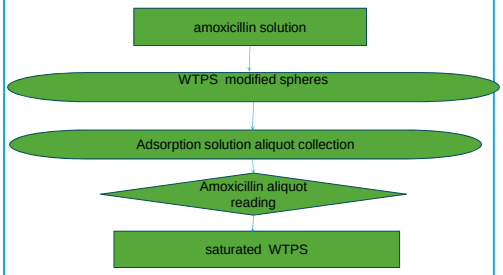

Figure 1: Process flux used in fixed bed adsorption

RESULTS

Table 1: Results for fixed bed WTPS adsorption

WTPS_pellets (g)	V (mL.min^{-1})	Removal (%)	Treated volume (L)
10	2	65	0,24
20	6	53	0,72
20	2	54	0,24
8	6	35	0,72

DISCUSSION

The Figure 2 shows the breakthrough curves in different flux rate and WTPS modified spheres mass.The comparison between the curves of different mass and flux rates indicates as expected the removal percentage increases with the spheres mass, and reduces when the flux rate increases. The better condition was obtained with 10g, 2 mL min^{-1} with 65 % of amoxicillin removal percentage, in spite of the treated volume was only 0.24 L. Considering the efficiency for higher treated water volume, the better condition was reached using 20g with 6 mL min^{-1} and removal percentage of 53%.

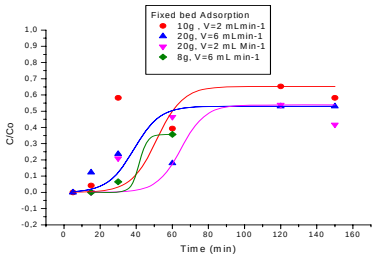

Figure 2: Breakthrough curves for different WTPS- pellets mass and flux rate.

CONCLUSIONS

• The conclusion was the use of WTPS as adsorbent material is promising. The use of fixed bed with 20g of modified WTPS pellets, abundant and low cost material, treat about 0.72 L of contaminated water with amoxicillin and derivatives in 120 min.

•The removing percentage was 53% of the toxic compounds with an abundant and low cost novel adsorbent material to treat and remove antibiotics from contaminated water, sewage and wastewater before reach the water resources. Such process can be also used in sewage discharge of urban rivers before their discharge in water resources, a possible control and maintenance of water quality of urban water resources, always suffering the pressure of the urban expansion with the most common and irregular sewage discharge.

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Ortiz,N.;Pires, M.A.F.; Bressiani, J.C. (2001), The use of converter slag as nickel absorber to wastewater treatment –Waste management Journal, 21, p. 631-635.

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