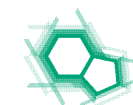


BIOMASS-BASED RESIDUES VALORIZATION FOR THE REMOVAL OF SERTRALINE FROM WATERS BY ADSORPTION

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INTRODUCTION

Pharmaceutical drugs reach the environment through several anthropogenic sources being scattered and accumulated across flora, fauna and all types of aquifers. Many of these compounds are intensively worldwide medical prescribed for the relief of most common diseases related with modern society, such as hormones, antidepressants, analgesics, antibiotics, anti-inflammatories, among others. Sertraline is a pharmaceutical drug used for the relief of depressive severe situations. Recent studies refer that some compounds belonging to this pharmaceutical class of drugs, despite of its very low level of concentration in water can be responsible for several and severe side-effects in the environmental fauna and flora based on toxicity and risk predictions [1-2].

Adsorption equilibrium studies between the adsorbent and sertraline will be presented using the batch method. The main adsorption conditions that affect the removal efficiency, such as the suspension pH value, the contact time and the mass of the adsorbent used will be optimized. The adsorption kinetics and the adsorption equilibrium isotherms are also relevant measurements that must be considered in future.

MAIN OBJECTIVE

This work aims to study the removal of sertraline from aqueous solutions using activated carbon obtained from olive stones.

METHODOLOGY

- Preparation of the adsorbent obtained from olive stones.
- Quantification of sertraline present in aqueous samples by UV-Vis (230 nm).
- Study the effect of some adsorption conditions in the sertraline removal efficiency:
 - pH of the suspension;
 - mass of the adsorbent;
 - temperature.
- Study the kinetics of the adsorption

PREPARATION OF THE ADSORBENT (OSAC)

- Wash the olive stones with water and dry;**
Grind the pits to an average size of 0.25 mm using a mill;
Acid activation of the powder using following procedure:
- Add 10% aqueous solution of sulfuric acid in a proportion of 1:3 in 50 g of adsorbent
 - Wash the adsorbent with 1000 mL of distilled water
 - Dry for 6 h at ambient temperature
 - Dry in oven at 110°C for 24 h
 - Carbonization in oven at 550°C for 60 min.



BIOMASS-BASED ADSORBENT CHARACTERIZATION

Table 1. Textural properties of the ACOS.

S_{BET} ($m^2 g^{-1}$)	$S_{Langmuir}$ ($m^2 g^{-1}$)	S_{ext} ($m^2 g^{-1}$)	S_{mic} ($m^2 g^{-1}$)	V_{mic} ($mm^3 g^{-1}$)	V_{mic}/V_{tot} al (%)	W_{mic} (nm)
409	608	16	393	213	92	2.2

Table 2. Physicochemical properties of ACOS.

Acidic sites ($\mu mol H^+/g$ adsorbent)	Acidic sites ($\mu mol H^+/g$ adsorbent)	pZc
877.4	44.7	3.17

QUANTIFICATION BY UV-VIS SPECTROMETRY

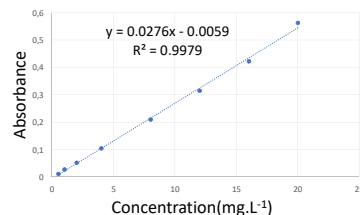


Figure 1 – Sertraline calibration curve.

EXPERIMENTAL RESULTS FOR REMOVAL OF SERTRALINE USING OSAC

3. INITIAL CONDITIONS FOR ADSORPTION STUDIES

Temperature	25 °C
Speed	150 rpm
Sertraline concentration	20 mg.L ⁻¹
Volume	50 mL
Adsorbent	50 mg

3.1 EFFECT OF THE pH

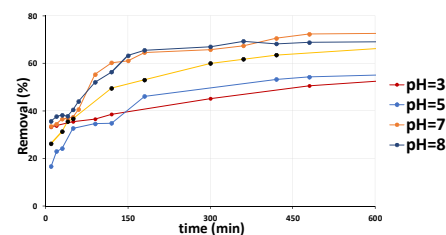


Figure 2 – Effect of pH in the removal of sertraline.

3.2 EFFECT OF THE ADSORBENT MASS

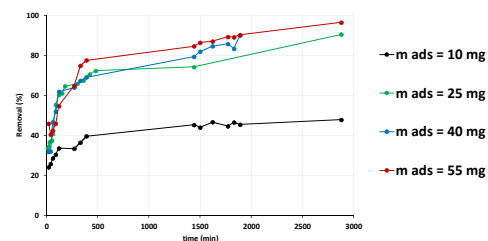


Figure 3 – Effect of the mass of the adsorbent in the removal of sertraline.

4 KINETICS STUDY

PFO linear model $\ln(q_e - q_t) = \ln q_e - k_1 t$

PSO linear model $\frac{t}{q_t} = \frac{t}{q_e} + \frac{1}{k_2 q_e^2}$

$$q_t = \frac{(C_0 - C_t) \times V}{m_{ads}}$$

CONCLUSIONS & FUTURE WORK

- Based on the adsorption tests, it is clear that the activated carbon used in this work has high porosity resulting in a great adsorptive power.
- sertraline demonstrated an optimal adsorption interaction with the adsorbent that presented an high efficiency in sertraline drug removal.
- Other adsorption parameters are under study, such as, adsorbent/adsorbate concentration ratio and temperature.

Acknowledgments

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