

Using activated carbon adsorbents obtained from plastic wastes from the Tunisian beverage industry

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AIM OF THE WORK

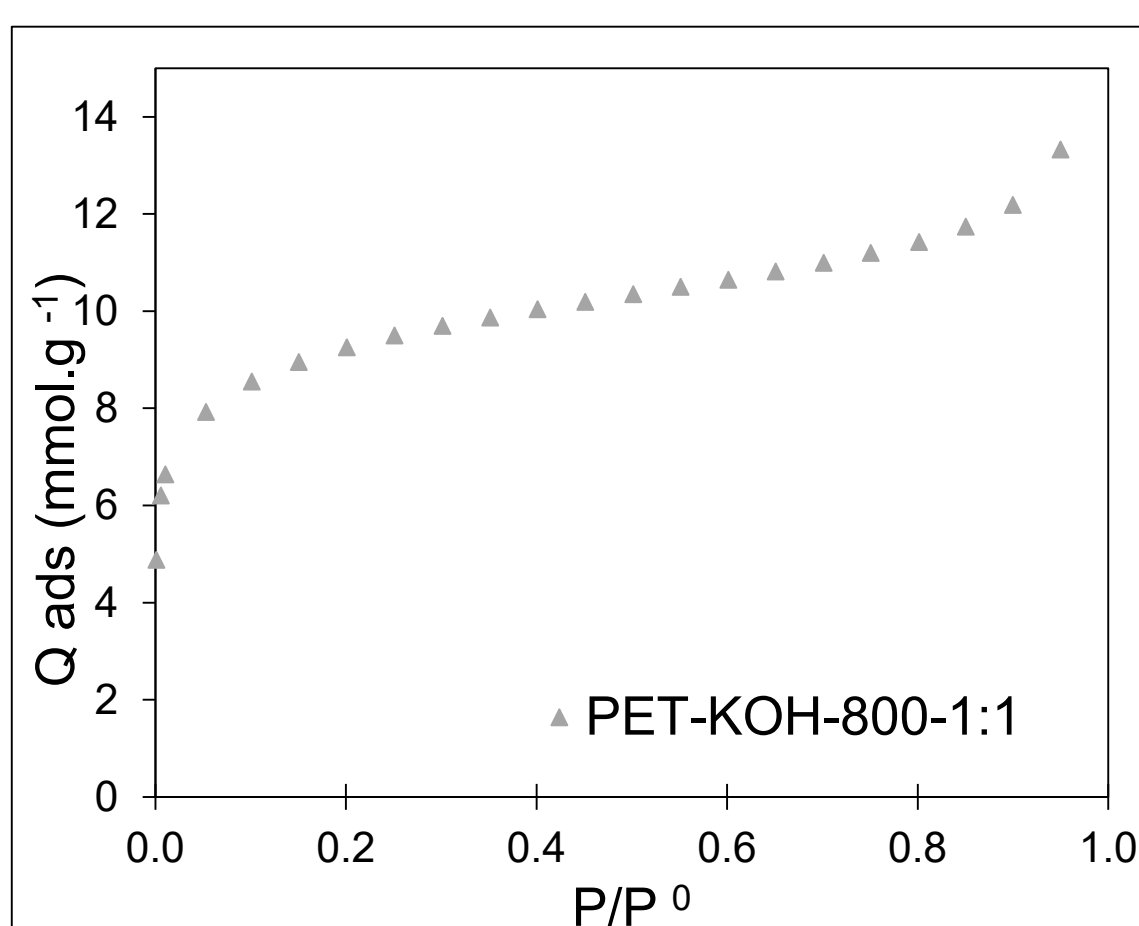
- ✓ Valorization of PET waste,
- ✓ Physicochemical modification of PET waste properties to obtain an advanced material AC,
- ✓ Study of its potential use as adsorbent for sulfamethoxazole and Trimethoprim removal from liquid phase

METHODS

AC preparation

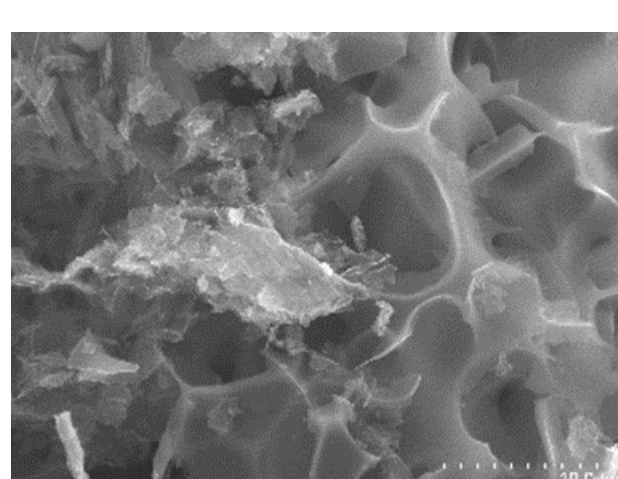
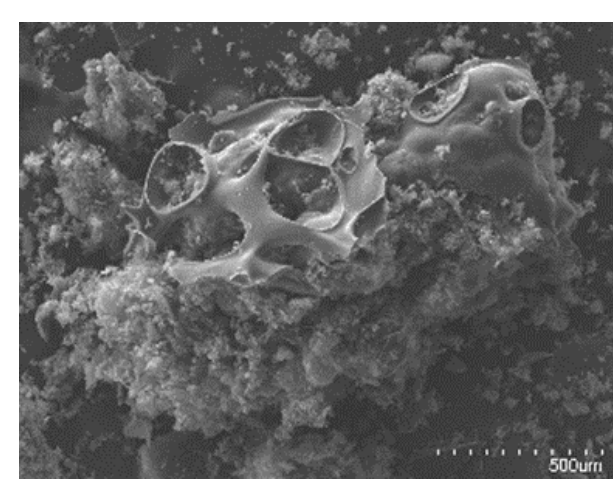


Characterization of activated carbon PET-KOH 800 1:1



Activation mode	Chemical
Sample name	PET- KOH-1:1-800
Yield (%)	20.2
$S_{BET} / m^2 g^{-1}$	732.7
$A_s / m^2 g^{-1}$	93.2
$V_s / cm^3 g^{-1}$	0.31
$V_0 / cm^3 g^{-1}$	0.21
L_0 / nm	2.86

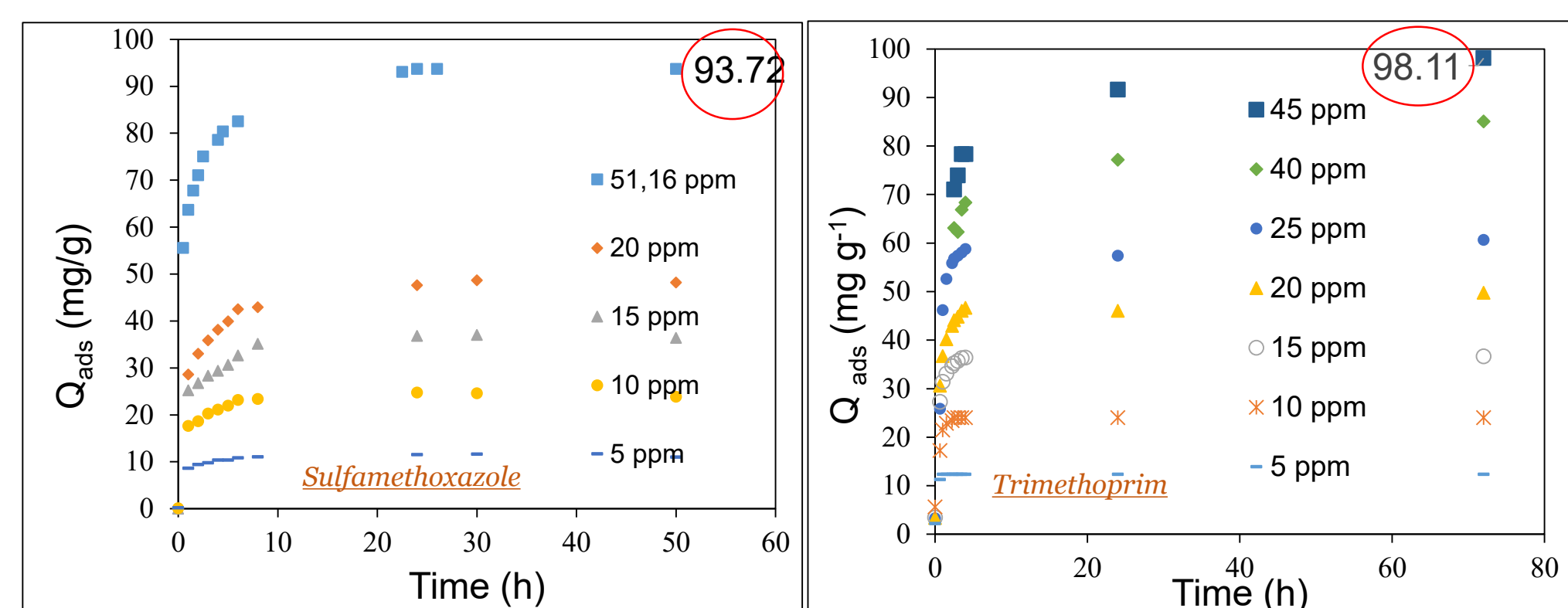
sample	C /%	H /%	N /%	O /%
PET-KOH-800-1:1	82.9±1.9	2.0±0.4	--	15.1



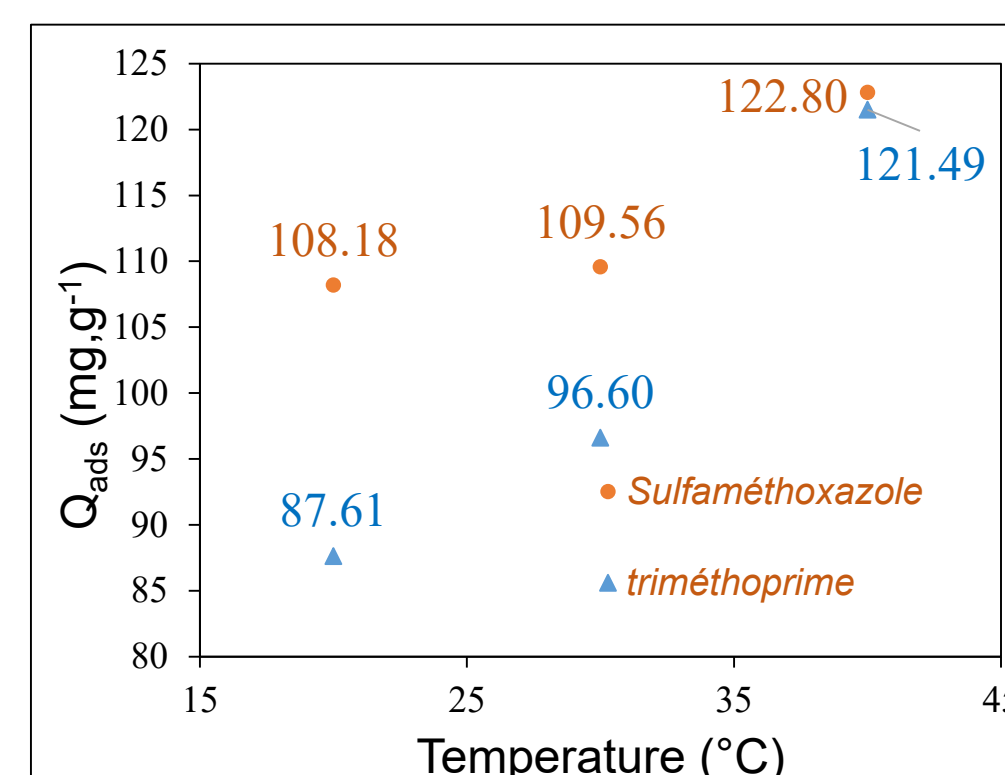
Sem images of PET-KOH-1:1, with high porosity structure

RESULTS / DISCUSSION

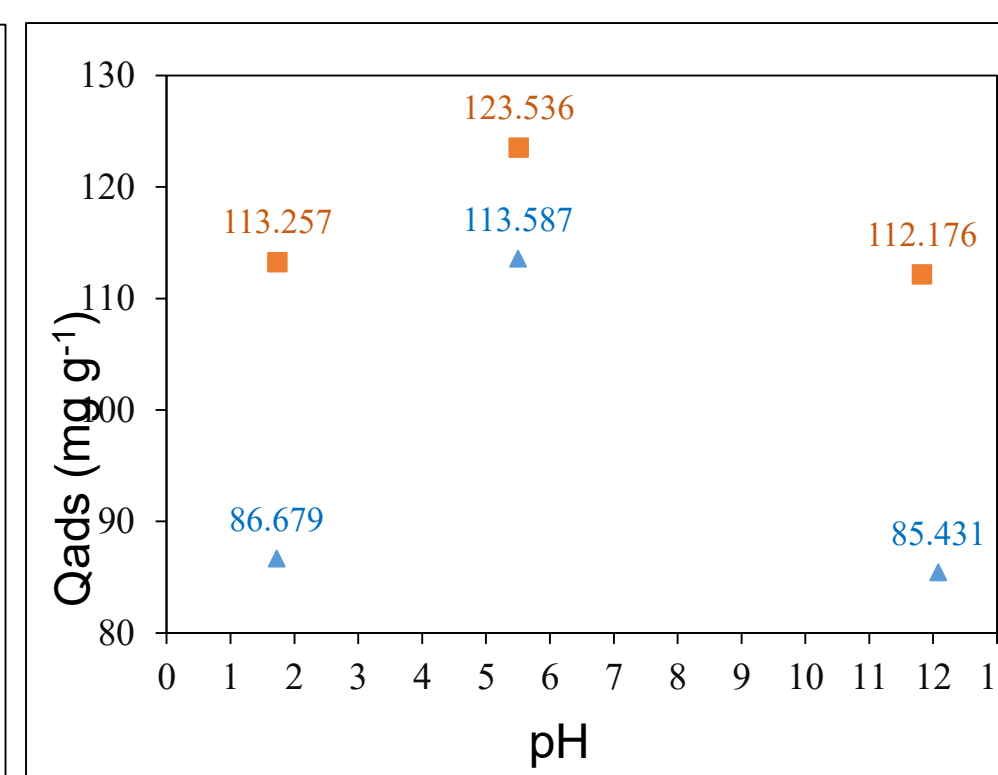
Kinetic study of sulfamethoxazole and Trimethoprim adsorption, with different initial concentrations, on PET KOH-1:1-800



Effect of temperature



Effect of pH



- ✓ The AC prepared from waste PET at 800°C, (PET-KOH 800 1:1) presents a large surface area and high pore volume.
- ✓ Adsorption is a promising advanced treatment process that can remove many of the pharmacological products from wastewater [1].
- ✓ In our work, Increasing temperature affects positively the adsorption of both antibiotics on PET-KOH-800-1:1.
- ✓ Adsorption of sulfamethoxazole and trimethoprim decreases significantly at pH values above pH_{pcz} (8.3) and below pK_a. The best results were obtained at pH =7.2.
- ✓ PET-KOH-1:1-800 exhibited a maximum adsorption capacity of 108.17 and 98.11 mg g⁻¹, respectively for sulfamethoxazole and trimethoprim.

CONCLUSION

- ✓ The use of waste PET to prepare AC, is an excellent way to obtain low-cost adsorbents to treat wastewater, mainly concerning the antibiotics removal from the liquid phase

REFERENCES

- [1] M. Sagaseta de Ilurdoz, J. Jaime Sadhwani, J. Vaswani Reboso, Antibiotic removal processes from water & wastewater for the protection of the aquatic environment - a review, Journal of Water Process Engineering, 45, 2022, 102474, <https://doi.org/10.1016/j.jwpe.2021.102474>.