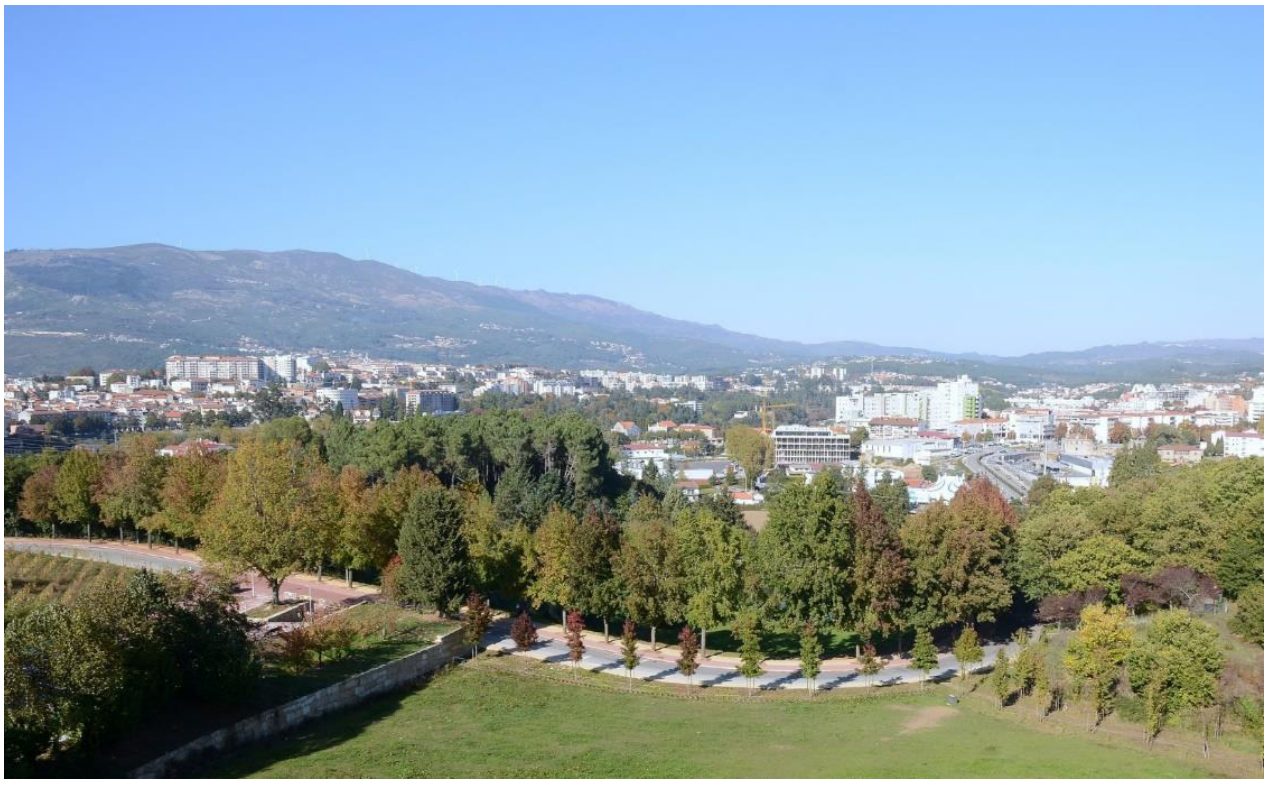
8 PYCheM

Portuguese Young Chemists Meeting

17-19 May 2023 Vila Real



UNIVERSIDADE DE TRÁS-OS-MONTES E ALTO DOURO

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VALORIZATION OF OLIVICULTURE RESIDUES FOR THE REMOVAL OF ESTROGENS FROM WATER

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Estrogens belong to the class of water micropollutants named as endocrine disrupting chemicals and are considered persistent substances in the environment. Estrogens are a type of hormones that are continuously released to environment presenting several undesirable effects on aquatic species and human health even when present at very low concentrations (trace levels) [1, 2]. Additionally, it is known that traditional sewage and drinking water treatment plants are not able to remove or degrade these compounds and additional treatments are required [3, 4]. Currently, there is an effort to produce bio-based adsorbents that are able to remove efficiently a wide range of micropollutants from water [5]. With the present work we will present an extensive set of experimental results that presents the valorization of olive stones residues to prepare activated carbons to be used as adsorbent for the removal of estrone (E1), 17β-estradiol (E2) and 17α-ethinylestradiol (EE2) by adsorption from water. Five different adsorbents were produced, namely powdered olive stone (OS), physical activated at 800°C (CF), carbonized at 500°C (CC), chemical activated using phosphoric acid (CA) and chemical activated with sodium hydroxide (CB). The carbonization yield was calculated and the pH at point of zero charge (pH_{PZC}), BET surface area (S_{BET}) of the carbonaceous materials were determined (see **Table 1**). The simultaneous removal of the three estrogens (E1, E2 and EE2) from water was evaluated for all the five prepared adsorbents. For the adsorbent with the best removal performance, a kinetic study was also carried out. The obtained results show that olive stones exhibit potential for the production of ACs with high surfaces used to remove estrogens from water.

Table 1: **Surface properties and estrogen removal in olive stone adsorbents.**

Adsorbents	Yield (%)	pH_{PZC}	S_{BET} (m^2/g)	Total estrogen removal (%)
OS	-	5.43	4	24.2
CF	23.0	8.64	14	24.9
CC	26.9	8.46	67	51.2
CA	57.5	3.84	590	96.4
CB	33.9	8.92	27	36.6

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