THE USE OF SYNTHETIC POLYMERS ISOLATED OR IN A MIXTURE TO PRODUCE ACTIVATED CARBONS

BELO, C.R.[1,2] , CANSADO, I.P.P.[1] & MOURÃO, P.A.M.[1]

1. CENTRO DA QUÍMICA DE ÉVORA, DEPARTAMENTO DE QUÍMICA DA UNIVERSIDADE DE ÉVORA, ESCOLA DE CIÊNCIAS E TECNOLOGIA
2. DEPARTAMENTO DO ENSINO DE QUÍMICA DA UNIVERSIDADE NACIONAL TIMOR LOROSA'E, DILI – TIMOR LESTE

I OBJECTIVES

Production of activated carbons through physical and chemical activation from synthetic polymers isolate or in a mixture.

Comparative study of the influence of textural and chemical parameters of activated carbons on the MCPA adsorption from the liquid phase.

II INTRODUCTION

Human activity is reflected in a continuous taking advantage of natural resources of the earth and increasing production of industrial, urban and agricultural wastes [1]. One of the main adsorbent that famously used to remove the contamination of soils and ground water from the widespread use of pesticides in modern agriculture is the activated carbons. Since the presence of herbicides in water can cause serious problems in the environment and to human health, their removal from wastewaters is a crucial issue [2]. However, the research for cheaper AC with high adsorption capacity for pesticides removal from the liquid phase steel very promising.

III EXPERIMENTAL

● Production of Activated Carbons

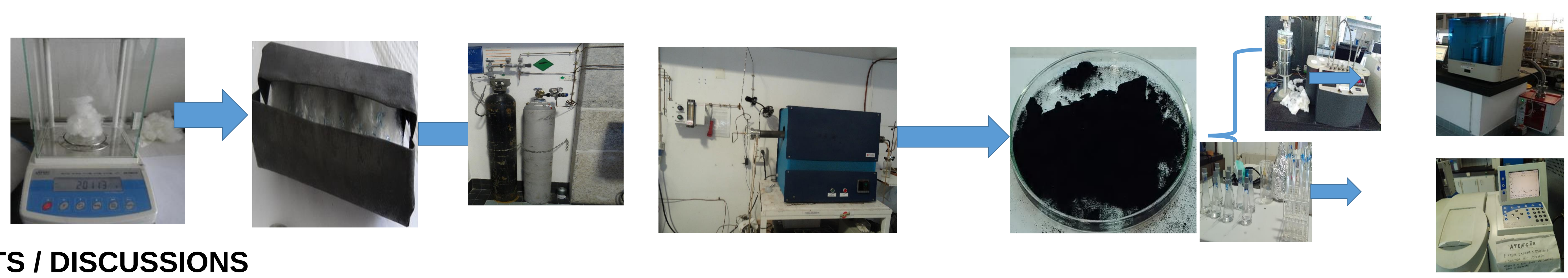
- Synthetic polymers, such PET and PAN were used as raw materials to prepare AC through physical and chemical activation.
- AC production was performed in a horizontal tubular furnace with CO_2, at 1073 K. A dwell step, at 573 K, was used in order to stabilize the precursors;
- Chemical activation was also accomplished with K_2CO_3 at 1073 K, with a mass ratio of chemical agents/precursor = 2;

● Physical and Chemical Characterisation

- Nitrogen adsorption at 77 K, Elemental analysis, Fourier transform infrared spectroscopy and point of zero charge;

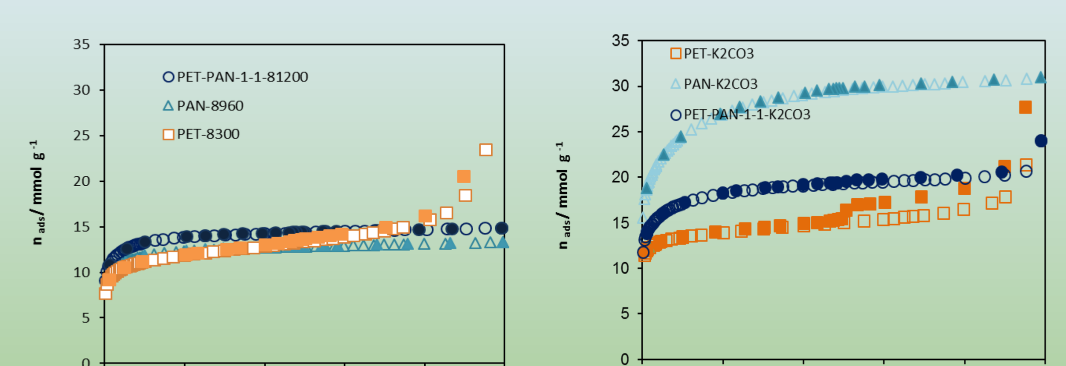
● Adsorption of pesticide, MCPA, from liquid phase

- A fixed amount of adsorbent was added to a flask containing the same volume of aqueous solutions with different initial known concentrations of MCPA. The tests were completed in a thermostated shaker bath, at 298 K, pH medium controlled and an equilibrium time of 2 days; Residual concentrations of pesticides were determined by UV-Vis;

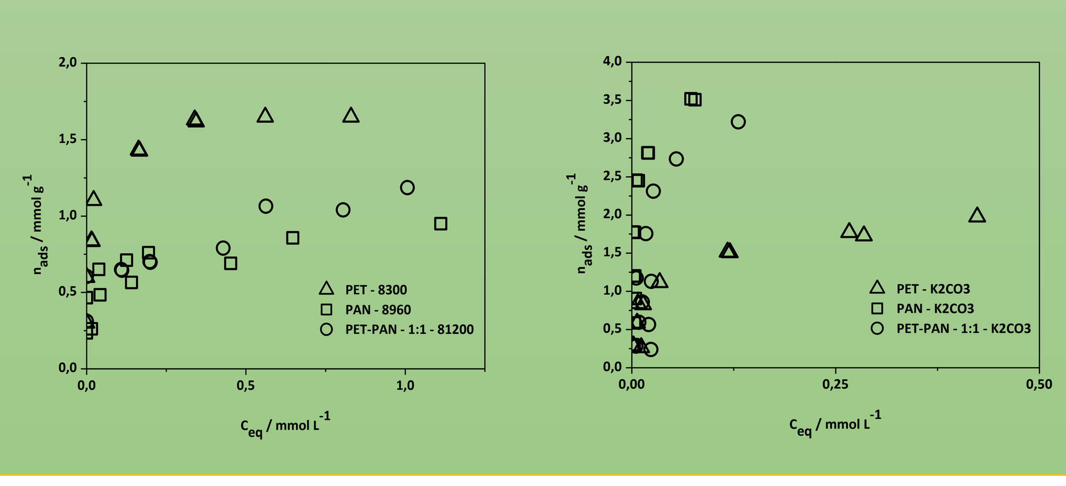


IV RESULTS / DISCUSSIONS

● Characterisation Structural and Chemical



● Adsorption of MCPA from liquid phase



❖ **AC materials: Physical activation: Type I Isotherms ⇒ microporous materials**

Micropore volume: 0.11-0.56 cm^3g^{-1}; mean pore size ~0.82–3.27 nm

❖ **Chemical activation: Type I Isotherms ⇒ microporous materials**

Micropore volume: 0.27-0.95 cm^3g^{-1};

❖ **AC materials: Point of zero charge (pHpzc) and AE**

From 8.8 on PET-8120 to10.8 on PET-PAN-720

Carbon (wt%): From 61.7 on PAN-8240 to 88.1 on PET-PAN-720

❖ **MCPA adsorption capacity from the liquid phase**

❖ **AC physical activated**

❖ MCPA adsorption: from 1.0 mmol g^{-1} on PET-PAN-1-1-81200 to 1.65 mmol g^{-1} on PET-8300.

❖ **AC chemical activated**

❖ MCPA adsorption: from 1.9 mmol g^{-1} on PET-K_2CO_3 to 3.5 mmol g^{-1} on PAN-K_2CO_3.

V CONCLUSIONS

- Physical AC presents a developed porous volume reaching 0.56 $cm^3\ g^{-1}$
- Chemical AC with K_2CO_3 presents a yield ranging from 21.6 to 24.5 wt% and achieved a higher porous volume reaching 0.95 $cm^3\ g^{-1}$
- The AC were successfully applied on the MCPA removals from the liquid phase, it is of note that chemical activated carbon presented a better performance

VI BIBLIOGRAPHY

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