Using Waste Recycled PET for AC Production for Pesticides Removals from Aqueous Solutions.

I.P.P. Cansado[a], C. Galacho[b], A.S. Nunes[c], M.M.L. Ribeiro Carrott[d] and P.J.M. Carrott[e]

Centro de Química de Évora, Departamento de Química da Escola de Ciências e Tecnologia, Universidade de Évora. Rua Romão Ramalho nº59, 7000-671 Évora - Portugal

[a]ippc@uevora.pt, [b]pcg@uevora.pt, [c]angeladsn@gmail.com, [d]manrc@uevora.pt, [e]peter@uevora.pt

Over the last decades the literature has shown the possibility of producing activated carbons (AC) from a wide variety of raw materials and to use them as one of the most environment-friendly solutions for waste disposal. Additionally it has been shown that the adsorption of pollutants from different media by AC is one of the most efficient techniques for remediating or solving this type of problem [1]. In this context, the presence of pesticides in water can cause serious problems in the environment and to human health; their removal from wastewaters is a crucial concern. The work presented here focuses these two problematic areas (solid waste reduction and wastewater treatment). The main idea was to develop low cost and efficiently adsorbent materials for hazardous compounds removal from aquatic media, to level admitted in drinking water [2]. In this perspective, we present a study involving the production of AC, by chemical activation with KOH, from wastes PET (PET-2-700), the optimisation of the post modification treatment with urea (PET-2-700Ux) and their applicability for the adsorption of 4-chloro-2-methylphenoxyacetic acid (MCPA).

All AC were characterised in relation to their structural properties and chemical composition, by different techniques and the results were presented in a previous paper [1]. The kinetic and equilibrium studies of MCPA adsorption was defined as 72h at pH=3. The maximum adsorption capacity and the percentage removal was dependent on the initial concentration and for lower MCPA concentration the removal could reach 100%, allowing to achieve values acceptable in drinking water [2]. The higher MCPA adsorption capacity was obtained with the AC submitted to a post treatment with urea, however, the post modification conditions must be optimised in order to increase the pore volume and the MCPA adsorption at higher concentration. The present work revealed that original AC prepared from PET or after an adequate post treatment, are very promising adsorbents for MCPA and similar compounds removal of from aqueous medium, as these AC present already adsorption capacities higher then the commercial one used for this purpose [3].

References

[1] I.P.P: Cansado, C. Galacho, A.S. Nunes, M.M.L. Ribeiro Carrott and P.J.M. Carrott, *Adsorption Science and Technology* - in Press.
[2] Decreto-lei nº 306/2007, Diário da República Portuguesa, 1.ª série (164) (2007) 5747.
[3] O. Gimeno, P. Plucinski and S.T. Kolaczkowski. *Ind. Eng. Chem. Res*. 42 (2003) 1076.

Acknowledgements - This work was supported by the Fundação para a Ciência e a Tecnologia (Plurianual Finance Project Centro de Química de Évora (619)). The authors are also grateful to Selenis (Portugal) for the provision of the granulated recycled PET.