



XXII Encontro Luso-Galego
Química

9 a 11 novembro 2016

Instituto Politécnico de Bragança | BRAGANÇA - PORTUGAL



Livro de Resumos

<http://xxiilgq.eventos.chemistry.pt>



SOCIEDADE
PORTUGUESA
DE QUÍMICA



Colegio Oficial de
Químicos de Galicia

Adsorption of Sudan IV from oily wastewater by using modified activated carbon materials

**Jose L. Díaz de Tuesta^{1,*}, Rima Guliyeva¹, Maria Martin-Martinez¹,
Adrián M. T. Silva², Joaquim L. Faria², Helder T. Gomes¹**

¹Associate Laboratory LSRE-LCM, Instituto Politécnico de Bragança,
Campus de Santa Apolónia, 5300-253 Bragança, Portugal

²Associate Laboratory LSRE-LCM, Faculdade de Engenharia, Universidade do Porto,
Rua Dr. Roberto Frias, 4200-465 Porto, Portugal

**jl.diazdetuesta@ipb.pt*

A commercial activated carbon (AC: Norit ROX 0.8, D = 0.8 mm) was modified by chemical and thermal processes, following the procedures described elsewhere [1]. The materials were tested as adsorbents for the removal of a lipophilic pollutant, Sudan IV (S-IV), using a biphasic medium (water/cyclohexane) in order to simulate contaminated petroleum mixtures with water [2]. The AC was modified in successive steps considering: (1) grinding and sieving (< 250 μm) and (2) treatment with nitric acid, followed by hydrotreatment with urea and thermal treatment at 800 $^{\circ}\text{C}$ under inert atmosphere, resulting in the adsorbents PAC and PACNAUT, respectively. Adsorption experiments were performed in a 500 mL batch glass reactor, using 2.5 g of adsorbent per litre of organic phase, 2.5 g/L_{OP}. Fig.1A shows results with different particle size (p_s), initial S-IV concentration ($C_{S-IV,0}$) and AC modifications. As expected, it can be observed that adsorption is faster when p_s is smaller. However, the powdered activated carbon (PAC) is not able to adsorb all S-IV in high initial concentration (500 mg/L). This target was achieved with PACNAUT (adsorption of S-IV was 90 % at 1 h and 2.5 g/L_{OP} of adsorbent, higher than the removal observed by other authors [2] at the same time and 4 g/L_{OP} of material). The adsorption kinetics was fitted by a pseudo-second-order model to the data obtained with 500 mg/L of $C_{S-IV,0}$ (Fig. 1B). PACNAUT has higher adsorption capacity (q_e) and rate constant (k_s).

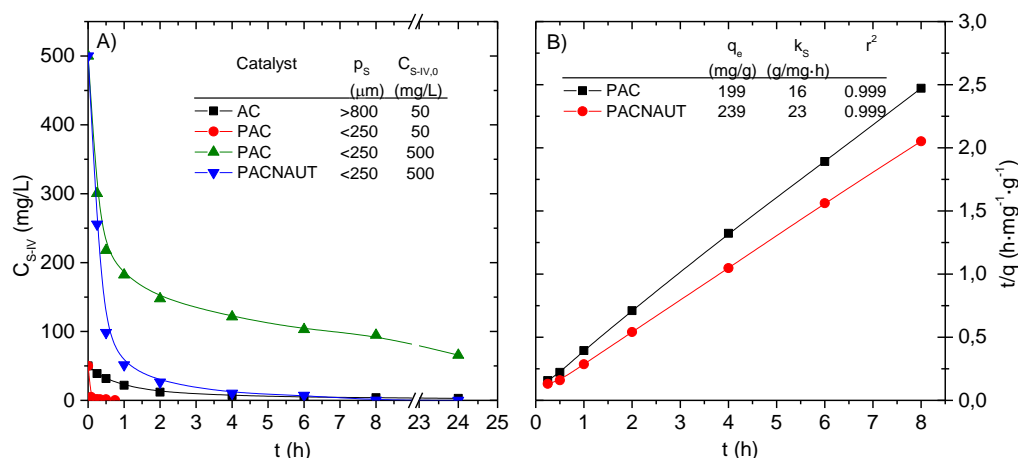


Fig.1. Removal of S-IV in runs performed with different p_s , $C_{S-IV,0}$ and adsorbents (A) and kinetic model fitted for the experiments carried out with PAC and PACNAUT materials at $C_{S-IV,0} = 500$ mg/L (B).

Acknowledgments

This work is a result of project "AIPProcMat@N2020 - Advanced Industrial Processes and Materials for a Sustainable Northern Region of Portugal 2020", with the reference NORTE-01-0145-FEDER-000006, supported by NORTE 2020, under the Portugal 2020 Partnership Agreement, through the ERDF and of Project POCI-01-0145-FEDER-006984 – Associate Laboratory LSRE-LCM funded by ERDF through COMPETE2020 - POCI – and by national funds through FCT. This work was financially supported also by FCT Investigator 2013 Programme (IF/01501/2013), with financing from the European Social Fund and the Human Potential Operational Programme.

References

- [1] R.S. Ribeiro, A.M.T. Silva, J.L. Figueiredo, J.L. Faria, H.T. Gomes, Applied Catalysis B: Environmental, 140-141 (2013) 356.
- [2] A.A.S. Oliveira, I.F. Teixeira, T. Christofani, J.C. Tristão, I.R. Guimarães, F.C.C. Moura, Applied Catalysis B: Environmental, 144 (2014) 144.