



**“Gheorghe Asachi” Technical University of Iasi, Romania**



---

## **ALTERNATIVE APPROACHES FOR AMOXICILLIN REMOVAL FROM WATER – FENTON’S OXIDATION VERSUS SORPTION BY ALMOND SHELL ASHES**

**Vera Homem, Arminda Alves, Lúcia Santos\***

*LEPABE— Laboratory for Process Engineering, Environment, Biotechnology and Energy, Faculty of Engineering,  
University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal*

---

### **Abstract**

This study was developed to compare from technical and economic point of view the treatment of amoxicillin (AMOX) aqueous solution by Fenton’s oxidation and adsorption with almond shell ashes. In order to degrade ppb levels of amoxicillin, the optimal conditions were obtained for both processes and each was able to totally degrade/remove the antibiotic (Fenton process:  $[AMOX]_0 = 450 \mu\text{g L}^{-1}$ ,  $\text{pH} = 3.5$ ,  $T = 40 \text{ }^\circ\text{C}$ ,  $\text{H}_2\text{O}_2/\text{AMOX}$  molar ratio = 56,  $\text{H}_2\text{O}_2/\text{Fe}^{2+}$  molar ratio = 41; Adsorption process:  $[AMOX]_0 = 450 \mu\text{g L}^{-1}$ ,  $\text{pH} = 6.5$ ,  $T = 20 \text{ }^\circ\text{C}$ , 50 mg adsorbent.). Fenton’s oxidation exhibited higher removal rates than sorption (total removal achieved after 90 min by Fenton and 300 min by adsorption). In addition, costs associated with Fenton’s reagent consumption are about 10 times lower than sorption. Therefore, Fenton process seems to be the most cost-effective treatment.

*Key words:* amoxicillin, adsorption, Fenton's oxidation, remediation

*Received:* May, 2012; *Revised final:* October, 2012; *Accepted:* October, 2012

---

---

\* Author to whom all correspondence should be addressed: e-mail: [lsantos@fe.up.pt](mailto:lsantos@fe.up.pt); Phone: +351 225081682; Fax: +351 225081449