

Program	PN II – Partnerships in prioritised areas. Contract : 32131/2008
Project title (ENG):	Promotion of photo-induced based green technologies for water treatment with pesticides content, FENPEST
Project title (RO):	Promovarea tehnologiilor verzi bazate pe procedee de oxidare fotoinduse in tratarea apelor cu continut de pesticide, FENPEST
Duration	2008-2011
Team Leader	Ph.D. eng. Nitoi Ines
Summary (short description) ENG	<p>Development of a technology for advanced degradation of pesticides (maximum admitted concentrations $<0.1 \mu\text{g/L}$) from water applying an advanced photocatalytic oxidation process, using sunlight as UV-VIS irradiance source, associated with iron based catalyst separation by flotation and its valorization in the degradation process. Project results were concretized by the followings:</p> <ul style="list-style-type: none"> -Establishment of database regarding the mechanisms, kinetics, performance of Fenton, photo-Fenton advanced oxidation processes on pesticides degradation and the flotation process applied for catalyst recovery; -Definition of contaminated sites with various classes of pesticides by identifying their concentration domains and associated pollution matrices of different water sources; -Unitary flow developed for the treatment of water containing Lindane by advanced oxidation – flotation process includes: <ul style="list-style-type: none"> – <i>Wastewater treatment line</i> with the following sequence of operations: <i>pretreatment by settling, UV-VIS/H₂O₂/Fe²⁺ advanced oxidation- Fe³⁺precipitation-flotation</i>; – <i>Line of Fe³⁺ recovery (as FeSO₄)</i> applying the following operations: <i>centrifugation-acid solubilisation</i>. The product obtained can be capitalized as photocatalysts in the advanced oxidation treatment phase or as coagulant for other water treatment processes. <p>For each proposed stages / operations the operating parameters and the consumptions of reagents were set in order to assure advanced degradation of Lindane from wastewater (tens $\mu\text{g/L}$) and Fe³⁺separation, with the compliance of treated effluent quality with the limits for discharging into surface waters (Lindane $\leq 0.02 \mu\text{g/L}$, $\Sigma \text{HCH} \leq 0.042 \mu\text{g/L}$, Fe $<2 \text{mg/L}$).</p>
Summary (short description) RO	<p>Proiectul isi propune elaborarea unei tehnologii de degradare avansata a unor pesticide (concentratii maxim admise $< 0,1 \mu\text{g/l}$) din apa, prin aplicarea unui procedeu fotocatalitic de oxidare avansata care utilizeaza lumina solara ca sursa de radiatii UV, asociat cu tratarea recuperativa prin flotatie a fierului, catalizator in procesul de degradare. Principalele rezultate obtinute au fost urmatoarele:</p> <ul style="list-style-type: none"> -Constituirea bazei de date privind mecanismele, cineticile, performantele procedeeleor de oxidare avansata de tip Fenton, foto-Fenton aplicate in degradarea pesticidelor si a procedeeului de flotatie pentru separarea recuperativa a fierului; -Definirea unor locatii poluate cu diferite clase de pesticide prin identificarea domeniilor de variatie a concentratiei acestora si matricilor de impurificare specific diferitelor categorii de surse de apa; -Elaborarea fluxului unitar de tratare a apelor cu continut de Lindan prin procedeul integrat oxidare avansata-flotatie, care cuprinde: <ul style="list-style-type: none"> – <i>Linie de tratare ape reziduale</i> prin urmatoarea succesiune de operatii: <i>pretratare prin decantare (aplicata optional)-oxidare avansata UV-Vis/H₂O₂/Fe²⁺-precipitare Fe³⁺-flotatie</i>; – <i>Linie de recuperare Fe³⁺ sub forma de FeSO₄</i> prin aplicarea urmatoarelor faze/operatii: <i>centrifugare-solubilizare-reducere Fe³⁺ la</i>

	<p>Fe^{2+}. Produsul obtinut poate fi valorificat ca si catalizator pentru faza de oxidare avansata poluant sau ca agent coagulant pentru tratarea altor ape reziduale.</p> <p>Pentru fiecare din fazele/operatiile propuse s-au precizat parametrii de operare si consumurile de reactivi care asigura degradarea avansata a Lindan (1-1000 $\mu\text{g/L}$) din solutii sintetice si respectiv separarea recuperativa a Fe^{3+} (51-206 mg/L), cu conformarea calitatii efluentului tratat cu limitele de evacuare in ape de suprafata (Lindan $\leq 0,02 \mu\text{g/L}$, $\Sigma \text{HCH} < 0,042 \mu\text{g/L}$, $Fe^{3+} < 2 \text{mg/L}$).</p>
Dissemination of results	
Full-paper ISI	I., Nitoi , T., Oncescu, P., Oancea, Mechanism and kinetic study for the degradation of Lindane by photo-Fenton process, Journal of Industrial and Engineering Chemistry, Vol.19, No.1, pp.305-309, 2013
Conferences (platform, poster, abstract / full-paper)	I., Nitoi , A., Ballo, S.I. Florescu, O., Boboc, A., Bonzy, Consideration regarding degradation of some herbicides from aqueous systems by photo-Fenton, International Symposium "The Environment and Industry", SIMI, October 2009, Bucharest, Romania
	I., Nitoi , P. Oancea, S. I., Florescu, L., Dinu, Application of solar-Fenton process in Lindan degradation from wastewater, International Symposium „The Environment and Industry”, SIMI, November 2011, Bucharest, Romania