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Advanced oxidation processes and biotreatments for water recycling in the textile industry (ADOPBIO)



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Reporting

Project information		
ADOPBIO		Funded under Research and innovation in the specific programme
Grant agreement ID: 508723		for research, technological development and demonstration "Structuring the European Research
Project closed		Area" under the Sixth Framework Programme (FP6) 2002-2006
Start date 1 January 2005	End date 31 December 2006	Total cost € 602 435,00
		EU contribution € 388 970,00
		Coordinated by HELIOS ITALQUARZT SRL Italy

Final Report Summary - ADOPBIO (Advanced oxidation processes and biotreatments for water recycling in the textile industry)

The ADOPBIO project aimed to develop a wastewater decolouring and recycling treatment system for the

textile industry based on the combination of two methods, namely the advanced oxidation processes (AOPs) for decolouration and a bioflotation process for the destruction of residual organic loads. In addition, among ADOPBIO objectives was the development and implementation of control software based on artificial neural network and system dynamics. The proposal was anticipated to achieve complete decolourisation for every type of wet processes, such as finishing, bleaching or dyeing.

Therefore, a prototype was designed, implemented and validated by end users, i.e. textile finishing companies. This achievement was feasible through the organisation of ADOPBIO in clearly defined, yet interrelated, work packages (WPs) with specific partial objectives.

Specifications regarding the treated water quality, the cost effectiveness and ergonomics of the solution and the design and adaptability of the wastewater process were identified as part of WP1, which also analysed numerous wet techniques and developed a strategy against chemicals' accumulation. The analysis included a wide range of textile processes, in order to obtain results that reflected the variety of methods and materials that were utilised by the industry. The most representative operational conditions, chemicals and dying recipes were subsequently selected.

WP2 focussed on laboratory tests of the water treatment. A series of different reactors were used for the AOP and bioflotation processes and the behaviour of numerous commercial substances, with particular attention on the dyestuffs of the largest consume, was determined.

Furthermore, WP3 was concerned with the design of a treatment system prototype, including the development of the bioflotation treatment reactor, the AOPs pilot reactors, the dyeing machine and the recycling plant, combined with a salt extraction system. This WP resulted in the production of three-dimensional drawings for the product manufacturing stage.

On the other hand, WP4 developed the process control software. The necessary programming functionalities were determined and, following the software design, numerous tests, by means of process simulation, were completed. The model evaluation was performed using cross validation techniques.

WP5 was concerned with the treatment system manufacturing and fabricated reactors for ultraviolet (UV) and thermal-activated AOPs, as well as the bioflotation reactor and the dying machine, based on the outcomes of WP3. Its final outcome consisted of an integrated system whose parts were installed on a portable metallic base.

The developed prototype was evaluated and tested during the lifetime of WP6, which also examined its interactions with the control software and performed an analysis of the associated technical results and operational costs. It occurred that the ADOPBIO objectives regarding decolourisation and water reuse were successfully met. However, the plant operational costs were difficult to foresee because they were widely dependent on the dyeing processes of the different factories. Nevertheless, the project was anticipated to have a significant impact on the international textile industry.

Related documents

Final Report - ADOPBIO (Advanced oxidation processes and biotreatments for water recycling in the textile industry)

Last update: 14 April 2011

Permalink: https://cordis.europa.eu/project/id/508723/reporting

European Union, 2025