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Editorial

Editorial Catalysts: Special Issue on Trends in Catalytic Wet Peroxide Oxidation Processes

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The catalytic wet peroxide oxidation (CWPO) process is an advanced oxidation technology that has shown great potential for the decontamination of wastewater. CWPO allows the removal of recalcitrant organic compounds under mild conditions (temperatures and pressures in the range of 25–100 °C and 0.1–0.5 MPa, respectively) by using hydrogen peroxide (H_2O_2) as an oxidant, which is considered an environmentally friendly agent. This process requires a solid catalyst with redox properties to generate hydroxyl and hydroperoxyl radicals from the H_2O_2 decomposition. These radical species easily react with the pollutants, oxidizing them into biodegradable forms and finally into CO_2 and water.

This special issue gives an overview of the state-of-the-art CWPO research for the treatment of industrial and urban wastewaters and how this process can be integrated into the water treatment process [1]. It is illustrated that the high versatility of this low-cost technology, thanks to the CWPO operational flexibility, is easily adaptable to any kind of wastewater, either polluted by high-loaded recalcitrant organics in industrial wastewaters or by emerging pollutants at micro-concentration levels in urban waters., This versatility also stands on the application of different types of solid catalysts, which can be tailored according to the process requirements.

For this reason, intensive research effort has been focused on the development of catalysts capable of promoting the abatement of different pollutants in combination with an adequate stability for long-term use and high efficiency of H_2O_2 consumption. In this sense, supported gold nanoparticles have demonstrated to fit these requirements, and a rigorous revision of the main goals of CWPO in presence of gold catalyst can be found in the special issue [2]. However, deactivation cannot be completely avoided due progressive fouling of the catalyst by the condensation by-products formed upon reaction. An insight into the CWPO reaction mechanism in order to understand the formation, nature, and role of these species [3,4] as well as the hydroxyl radical production mechanism [5], has been also covered.

On the other hand, different innovative solutions show the current trends in the CWPO technology, mainly aimed at the development of an efficient process operated at ambient conditions, by assisting CWPO with UV light irradiation [6], solar light [7], air flow [8], or additional radical activators [9,10]; and also by operated under neutral pH with efficient production of hydroxyl radicals [11]. All these achievements, with significant impact on the operating cost of the CWPO units, were conditioned by the presence of a proper catalyst designed and tailored to provide the best performance.

Finally, we would like to acknowledge the work of excellence developed by the authors of all the contributions to this collection issue, the good aid provided by the involved editorial assistants, and the efforts and comments provided by the reviewers to improve the quality of the articles. Without them, this special issue would not have been possible.

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