



Advanced oxidation of industrial effluents under microwave irradiation: state of the art

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ABSTRACT

In the present study, recent progress in using microwave energy to enhance advanced oxidation of industrial effluents of poor biodegradability is reviewed and evaluated. The aim is to assess the potential of microwave-assisted advanced oxidation as an effective and viable remediation method, alternative to conventional treatment procedures. The use of microwave technology to overcome intrinsic drawbacks and improve environment-friendly processing of various wastes represents a challenging scientific area. Particularly, the oxidation/degradation efficiency under microwave irradiation of industrial wastewaters appears to be influenced by key operating factors including microwave frequency (915 or 2,450 MHz) and power level (200–800 W), oxidizing agent (usually H₂O₂), catalyst type and loading (up to 1 g·L⁻¹), pH (frequently 2–5 or even 7 and 9) and initial pollutant concentration. Due to a synergistic effect mainly attributed to increased generation of oxidative hydroxyl radicals (OH) induced by the microwave energy, the oxidation process of various pollutants (pesticides/herbicides, pharmaceuticals, dyes, etc.) is enhanced. Thus, almost complete pollutant degradation, reaction acceleration (reaction usually occurs in only 1–15 min), decreased consumption of chemicals and microorganisms destruction are achieved at low temperatures.

Keywords: Advanced oxidation; Industrial effluents; Microwave irradiation; Environment-friendly processing

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