

Applications of Advanced Oxidation Processes in Water and Wastewater Treatment

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Advanced Oxidation Processes (AOPs) refers to a set of chemical treatment procedures designed to remove organic and inorganic materials from contaminated air, water and wastewater by using powerful oxidants such as hydroxyl radicals (OH•). AOPs used in water and waste treatment include ozonation, ozone (O₃)/hydrogen peroxide (H₂O₂), ultraviolet light (UV) combined with H₂O₂, Fenton process, O₃/ titanium dioxide, γ -radiolysis, supercritical water oxidation among others. Since their early applications in the 1970's, AOPs have shown great potential in degrading organic pollutants. The AOPs are particularly useful for degrading biologically toxic or non-degradable materials such as aromatics, pesticides, petroleum constituents, and volatile organic compounds in wastewater. The contaminant materials are converted to a large extent into stable inorganic compounds such as water, carbon dioxide and salts (mineralization). Current applications of AOPs include the degradation of emerging contaminants such as persistent organic pollutants, endocrine disruptors, pharmaceuticals, personal care products, and surfactants, some of which cannot be reduced by conventional treatment technologies. This presentation is designed to bring forward the recent advances in the fundamentals as well as the application of the Advanced Oxidation Processes, especially in the field of water and wastewater treatment.

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Dr. Pamela Chelme-Ayala has currently a postdoctoral appointment in the Department of Civil and Environmental Engineering at the University of Alberta. Dr. Chelme-Ayala received her Ph.D. and Master's degree in Environmental Engineering from University of Alberta. She also holds a Bachelor degree in Civil Engineering. Dr. Chelme-Ayala's experience includes use of advanced oxidation processes to treat irrigation water and membrane concentrates. Her current research focuses on the use of nanomaterials for the remediation of oil sands process-affected waters.