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Applications of the Ultrasound Assisted Sono-Photolytic and Sono-Photocatalytic Process in the Removal of Environmental and Domestic Waste: A Review

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Municipal and domestic wastewater creates in the environmental problems and causes major difficulties for the local governments. Rapid and unplanned urbanization in the developing countries, especially environmental waste in metropolitan cities causes major problems [1]. Traditional wastewater removal processes are the most widely used treatment technology all over the world. However, conventional wastewater removal processes are not an energy-efficient approach in the wastewater treatment [2]. Domestic wastewaters contain a significant amount of energy. However, alternative processes should be used to remove harmful organic substances in the wastewater and to minimize energy consumption in the treatment process [3]. Sono-photocatalytic process is one of the best alternative processes preferred in the treatment of domestic wastewater.

When an aqueous solution is the reacted by ultrasonic irradiation, certain chemical effects occur due to the action of a pressure wave. As a result of sono-photolytic and sono-photocatalytic reactions occurring in the aqueous solution, organic pollutants in domestic wastewater turn into more harmless molecules [4]. Sono-photolysis process is the simultaneous use of ultrasonic sound waves and ultraviolet irradiation without any catalyst type as a result of the synergistic effect. Sono-photocatalysis process is the use of a metal oxide photocatalyst in the presence of ultrasonic and UV irradiation [5]. Sono-photocatalytic treatment process highly increases the overall efficiency of the advanced oxidation processes and chemical reaction kinetics. Sono-photocatalytic process reduces the need to use physical experimental conditions [6]. Sono-photocatalytic process also contributes to the efficiency of the photocatalytic degradation reactions by solving problems with the chemical effect of catalyst support relative to individual processes such as sonolysis and photocatalysis. The overall sono-photocatalytic effect is greater than the effects of sonolytic and photocatalytic processes [7].

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