

Title: Hexavalent Chromium Reduction by TiO_2 and ZnO Nanoparticules

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In photovoltaic industry, a wide variety of chemicals are involved in wafers manufacturing by using a large number of complex and sensitive processes. As a result, huge quantities of wastewater are generated with higher concentrations of heavy metals, such as hexavalent chromium Cr(VI), which is harmful to the human health and the environment, if it is thrown in nature [2]. Photocatalysis is one of the reduction methods of hexavalent chromium. The objective of this study is the use of two photocatalysts based on nanoparticles of metal oxides which are: titanium dioxide (TiO_2) and zinc oxide (ZnO) to reduce hexavalent chromium Cr(VI) which is a photovoltaic industry pollutant to trivalent chromium Cr(III) in the UV field. The effects of various parameters such as pH, the amount of the catalyst, the concentration of the pollutant and the hydrogen peroxide (H_2O_2) are discussed. As a final test, we used sunlight instead of the UV lamp. It was found that the catalytic process exhibited the highest photocatalytic activity using TiO_2 anatase than ZnO under the same operating conditions, so the reduction rates are higher with titanium dioxide than with zinc oxide. For TiO_2 the optimum dose of the photocatalyst is 0.4 mg L^{-1} at pH 3, the concentration of Cr(VI) 2.0 mg L^{-1} and the rate of the H_2O_2 is 0.26% (V/V). For ZnO the optimum dose of the photocatalyst is 0.9 mg L^{-1} at pH 5, the concentration of Cr(VI) 1.0 mg L^{-1}. The comparison of the process under the optimal conditions of UV light and sunlight the removal rates in case of titanium oxide are 75.62% and 25.14%, in case of zinc oxide are 42.53% and 13.56% respectively.

Biography

Dr. Dalila Ikermoud received her diploma of State Engineer in Industrial Chemistry with "Environment" option at Saâd Dahlab University (Blida-Algeria). From 2003 until 2016, she worked as a Chemical Engineer at the Centre National de Toxicologie (Algiers-Algeria), while preparing for the Magister degree at the Ecole Nationale Polytechnique (Algiers-Algeria), which she obtained in January 2010. Since 2016, she has been working at the Centre de Recherche en Technologie des Semi-conducteurs pour l'Energétique (CRTSE) (Algiers-Algeria) as Research Associate then as Research Master. She received her Doctoral degree in Environmental Engineering from the Ecole Nationale Polytechnique (ENP) in December 2020.

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