REMEDIATION OF WATER POLLUTED WITH PHARMACEUTICAL RESIDUES APPLYING PROCESSES OF PHOTOCATALYSIS AND ADSORPTION WITH ACTIVATED CHARCOAL AND NANOPARTICLES OF ZNO OBTAINED FROM RECYCLED ALKALINE BATTERIES

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Water remediation is a main concern now days, specially when its polluted with pharmaceutical residues, because these chemicals might have a huge impact in the flora, wildlife and human health. The industry has many remediation techniques, two of the principals are adsorption and photocatalysis, these have shown high levels of efficiency separately and combined, also the materials to use are easy to find at low cost. The investigation was based on photocatalysis with nanoparticles of Zinc oxide and adsorption with activated charcoal, both separately and combined, to remedy a fluid polluted with methyl orange, one of the most used colorants of the industry, including the pharmaceutical, even though it has high levels of toxicity. The study also includes tests with amoxicillin, the most commonly used antibiotic, derivate of penicillin, which can produce resistance if is frequently used. The methodology was divided in three stages, the first one, the preparation of the materials for the photocatalysis, mainly the synthesis of ZnO nanoparticles; for the second stage the photocatalysis and adsorption techniques were tested separately and finally the third phase was about the combination of both processes; for the second and third stages the pH and light parameters varied. The results were analyzed with spectroscopy UV- Vis, in the visible light range (380 nm – 780 nm), using water as reference. The outcome was above expectations with the combination of UV light, pH of 9, and 30 minutes time the pollution was nearly completely remedied, with the activated charcoal adsorbing the contaminants giving the opportunity to the ZnO nanoparticles to accelerate the decomposition process.

Keywords: Photocatalysis, Adsorption, ZnO nanoparticles

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