

Methylene Blue Removal Using NiO nanoparticles-Sand Adsorption Packed Bed

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Abstract : Many treatment techniques have been used to remove the soluble pollutants from wastewater as; dyes and metal ions which could be found in rich amount in the used water of the textile and tanneries industry. The effluents from these industries are complex, containing a wide variety of dyes and other contaminants, such as dispersants, acids, bases, salts, detergents, humectants, oxidants, and others. These techniques can be divided into physical, chemical, and biological methods. Adsorption has been developed as an efficient method for the removal of heavy metals from contaminated water and soil. It is now recognized as an effective method for the removal of both organic and inorganic pollutants from wastewaters. Nanosize materials are new functional materials, which offer high surface area and have come up as effective adsorbents. Nano alumina is one of the most important ceramic materials widely used as an electrical insulator, presenting exceptionally high resistance to chemical agents, as well as giving excellent performance as a catalyst for many chemical reactions, in microelectronic, membrane applications, and water and wastewater treatment. In this study, methylene blue (MB) dye has been used as model dye of textile wastewater in order to synthesize a synthetic MB wastewater. NiO nanoparticles were added in small percentage in the sand packed bed adsorption columns to remove the MB from the synthetic textile wastewater. Moreover, different parameters have been evaluated; flow of the synthetic wastewater, pH, height of the bed, percentage of the NiO to the sand in the packed material. Different mathematical models where employed to find the proper model which describe the experimental data and help to analyze the mechanism of the MB adsorption. This study will provide good understanding of the dyes adsorption using metal oxide nanoparticles in the classical sand bed.

Keywords : adsorption, column, nanoparticles, methylene

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