REMOVAL OF 2-CHLOROPHENOL IN WATER USING MONTMORILLONITE CLAY AND MONTMORILLONITE – POLYANILINE NANOCOMPOSITES

A PROJECT REPORT PRESENTED BY

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ABSTRACT

Chlorophenols are introduced into the environment by accidental spills, illegal release of industrial and municipal wastewater and excessive use of pesticides. Most of the Chlorophenols released into the environment go into water, with very little entering the air. Chlorophenols stick to soil and to sediments at the bottom of lakes, rivers, or streams. However, low levels of chlorophenols in water, soil, or sediment are broken down by microorganisms and are removed from the environment within a few days or weeks. Due to their inherent toxicity, they cause birth defects in humans and huge damage to the environment.

One of the methods used for removal of chlorophenols from the aqueous solution is the adsorption process. In this study, adsorption of 2-chlorophenol from aqueous solutions on to montmorillonite clay and organically modified clay was investigated as a function of pH and initial pollutant concentration. The organically modified clay adsorbent was prepared by modification of montmorillonite using polyaniline. The modification process involves replacing the inorganic exchange cations of the clay by organic cations. By implementing this method, *insitu* and *exsitu* Polyaniline based nanocomposites have been prepared. Out of these two kinds of nanoomposites, Montmorillinite which contains polyaniline in both internal and external surfaces shows high adsorption capacity within short period of time at wide range of pH values (pH 1 to 7). Adsorption capacity was determined by using Ultra-Violet Spectrophotometer. Fourier Transform Infra-Red Spectrophotometer and X-ray Diffractometer were used to investigate the properties of the montmorillonite clay and montmorillonite-polyaniline nanocomposite.

Maximum adsorption of 2-chlorophenol occurred at pH = 1 for both montmorillonite clay and montmorillonite-polyaniline nanocomposite systems. Adsorption of the 2-chlorophenol conformed to a physical adsorption and the Freundlich model provided the best fit for 2-chlorophenol molecules at pH = 1 for low concentrations.