

Evaluation of Aluminium Dross as Adsorbent for Removal of Carcinogenic Congo Red Dye in Wastewater

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Abstract. In this study, aluminium dross waste generated from aluminium smelting industries was employed as adsorbent in removing of congo red dye in aqueous solution. The raw aluminium dross as adsorbent was characterized using Scanning Electron Microscope (SEM), Brunauer-Emmett-Teller (BET) for surface area and X-Ray Fluorescence (XRF) Spectroscopy. Adsorption experiments were carried out by batch system at different adsorbent mass, pH, and initial dye concentration. The results showed that the per cent removal of dye increased as adsorbent mass increased. It was found that 0.4 gram of adsorbent can remove approximately 100 % of dye at pH 9 for dye concentration 20 and 40 ppm. Therefore, it can be concluded that raw aluminium dross without undergone any treatment can be effectively used for the adsorption of congo red in textile wastewater related industries.

1. Introduction

Dyes have been recognised as an issue that usually contaminates soil and groundwater. There are a lot of industries that apply dyes in their products such as textiles, foods, leather, plastics, paints, cosmetics and etc. The list is endless. It is approximately 10,000 of different types of commercial dyes and pigments that available in market and it is about 700,000 tonnes of dyes are produced every year throughout the world [1]. Discharged of these compounds to the environment not just only visible to the human, it also could contribute high organic loading and ecotoxicity of water bodies. These compounds that are visible in water bodies could absorb and reflect the sunlight that can retard the photosynthesis process. Some of these dyes are very toxic, carcinogenic or mutagenic to the human [1]-[3].

In the removal of these dyes, the most challenging are anionic dyes due to the bright coloured, very reactive in water and show acidic properties. Congo red is the most common dyes that can be found in rubber, plastic, textile and paper industries. Congo red has a benzidine based anionic disazo dye which has the structural stability that makes it hard to biodegrade. There are several methods have been reported for the removal of Congo red pollution such as adsorption with activated carbon, chemical oxidation, reverse osmosis and biological treatment but among these methods, adsorption is the best

