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Removal of Disperse Dyes in Aqueous Solutions with the Catalytic Effect of Metal Oxide/Clay Nanocatalyst by Applying Photocatalytic Ozonation Process

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Textile industry wastewater contains a large amount of the chemicals and dyestuffs. Therefore, it is difficult to treat textile industry wastes. Since they contain different organic substances, dissolved salts and heavy metal, they are highly painted and colored and they need to be treated first because they are released to the environment [1]. Water pollution of the textile paints related to the receiving environment creates an environmental problem all over the world [2]. These untreated textile wastes contain heavy metals and many dyes, chemical organic and inorganic compounds that can harm the environment and human health [3].

Disperse dyes are dyes that do not dissolve in the water at room temperature, the have non-ionic, small particles and hydrophobic properties. Disperse dyes are low molecular weight compounds containing amino and hydroxyl groups. Disperse dyes are used to dye hydrophobic fibers such as polyester, acetate, triacetate, nylon and acrylic [4]. Disperse dyes are characterized by the number of the soluble groups and molecular weights. Approximately 50% of the disperse dyestuffs are azo, 25% of the anthroquinone and the rest are methin, nitro and naphthaquinone groups [5]. Among disperse dyes, azo dyes with azo group attached to aromatic rings are of the great importance [6]. However, azo dyes are considered a threat to the environment due to their potential carcinogenic structures, degradation and toxicity [7]. In this study, the removal efficiency was investigation of the disperse dye in the metal-oxide/clay nanocatalyst by using photocatalytic ozonation process. The effects of disperse dye on the different parameters with the photocatalytic ozonation process were investigated. These parameters, effect of catalyst amount, effect of inlet ozone gas concentration, effect of initial disperse dye concentration, effect of solution pH and reusability of the nanocatalyst.

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