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**Dyes adsorption using clay and modified clay: A review**

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**Abstract**

The effective use of the sorption properties of different clays as sorbents for the removal of dyes from wastewater has currently received much attention because of the eco-friendly nature of clay materials. Dyes are complex class of organic compound having wide range of applications in textile and food industries and a large amount of dyes are wasted, which get mixed in natural water resources. Mixing of dyes in water resources must be prohibited for the safety of natural ecosystem. The adsorbents (natural and modified) have been successfully for the adsorption of dyes from wastewater. This review article highlights the importance of clay (simple and modified) as an adsorbent for the adsorption of dyes from textile wastewater. Appropriate conditions for clay-dye system and adsorption capacities of a variety of clays are presented and sorption process is critically analyzed in this study. Studies reported the clays as an adsorbent from 2004–2016 are included and different properties for the utilization of clay and clay-based adsorbents are discussed for effective removal of dyes. Based on studies, it was found that the clays (natural and modified) are affective adsorbents for the purification of wastewater containing dyes.

**Keywords:** Textile wastewater; Dyes-clay interaction; Adsorption; modified clay; Characterization; Kinetic; Equilibrium

**1. Introduction**

Dyes are colored organic compounds based on functional groups such as chromophoric group (NR<sub>2</sub>, NHR, NH<sub>2</sub>, COOH and OH) and auxochromes (N<sub>2</sub>, NO and NO<sub>2</sub>) [1]. There are different classes of dyes used for the dyeing of different substrates (Table 1), i.e., acid dyes are generally used for silk, wool, modified acrylics and nylon dyeing. These are also used in cosmetics, paper, food, ink-jet printing and leather dyeing. The major classes of acid dyes are azine, xanthene,

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