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Kinetic and equilibrium studies about sorption removal of textile dye from water

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Dyes are comprehensively used in food, textile, plastic, metal, pharmaceutical and many other industries. Currently, more than 700 000 tons of dyes are required each year, of which at least 10–15% are discarded into the wastewater and responsible for water pollution. These dyes alter the color of water, and inhibit light penetration, reducing the rate of photosynthesis and the oxygen level, causing damage to aquatic ecosystem. Often, these dyes are carcinogenic and initiate various diseases in humans.[1] Therefore, it is essential to remove dyes from wastewater.

Numerous processes have been used for removal of dyes, but the sorption process is one of the progressive and highly effective treatments. Sorbents synthesized using wood sawdust and chemically modified using inorganic oxides, such as alumina, are highly efficient, low-cost, renewable, ubiquitous, and environmentally friendly.[2]

The main aim of this research was modification of oak sawdust using alumina. The application of the sorbents was evaluated using textile dye Reactive blue 19 and the kinetics and equilibrium study of sorption process was studied in detail. The sorption mechanism was best described by Langmuir isotherm followed pseudo-second order kinetics and the maximal sorption capacity was 324.8 mg/g.

Keywords: wood sawdust; modification; alumina; kinetics; isotherms

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