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**Master Thesis Defense**

Entitled

*AQUEOUS WASTEWATER TREATMENT WITH ALUMINIUM OXIDE, SILICON DIOXIDE, AND ALGINITE*

by

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Date & Venue

1:00 pm

Thursday, 4 November 2021

<https://eu.bbcollab.com/guest/Od216473ebd347e5bf09e14c7449ab57>

Abstract

Wastewater, regardless of the source, has always found its way into our environment. If not treated, it can pose a threat to the life of humans as well as of aquatic organisms. In regard to the treatment of wastewater containing remnant organic dyes, the adsorption of these on recyclable sorbent materials such as alginite, alumina, and silica gel was evaluated. The main objective of this thesis is to evaluate the sorption process for dye tainted water, specifically stemming from educational and research laboratories. Adsorption studies of the wastewater with sorbent materials were carried out under different experimental conditions. The study investigates the impact of temperature, pH, and concentration of dye, amount of adsorbent, contact time, and particle size of the sorbent materials in batch experiments. To recycle the adsorbents, they were heated to 600°C, where the adsorbates are combusted. The potential use of alginite in the treatment of certain wastewater contaminated with dye was discovered and a limited possibility to recycle it at 600°C, whereas silica and alumina could be recycled completely. The adsorption capacity of alginite and silica was found to be almost the same for cationic dyes. Acidic alumina was found to be an effective adsorbent material for azo dyes and anionic dyes/stains, but also for textile dyes, with very high adsorption capacity. A promising treatment of mixtures of different dyes was achieved with the use of acidic alumina. The kinetics studies show that all adsorption processes of the dyes best fit pseudo-second-order kinetics.

**Keywords:** Adsorption, alginite, silica gel, alumina, adsorption mechanism, organic contaminants, sorbent materials.