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“CLEANER PRODUCTION INITIATIVES AND CHALLENGES FOR A SUSTAINABLE WORLD”

## Equilibrium and Kinetic Modelling Studies of Adsorption of Crystal Violet dye onto Zeolites of Coal Fly and Bottom Ashes

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### Abstract

The adsorption of the crystal violet dye (CV) over zeolites from coal fly ash (ZCL) and coal bottom ash (ZCP) was evaluated. The coal ashes were used in the synthesis of zeolites by alkaline hydrothermal treatment. The dye adsorption equilibrium was rapidly attained after 8 min and 10 min contact time for ZCL and ZCP, respectively. Pseudo-first- and second-order kinetic models have been applied to the experimental data and pseudo-second-order kinetic was found to describe the adsorption of the dye on the adsorbents. Intra-particle diffusion studies revealed that the adsorption rates were not solely controlled by the diffusion step. The equilibrium data of ZCL was found to best fit to the Langmuir model, while ZCP was best explained by the Freundlich model. The maximum adsorption capacities were 19,6 mg g<sup>-1</sup> for the CV/ZCL system and 17,6 mg g<sup>-1</sup> for the CV/ZCP system.

**Keywords:** coal fly ash; coal bottom ash; zeolite; basic dye; adsorption.

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