



## Evaluation of the factors influencing the performance of a natural zeolite-based biologically aerated filter

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Received 31 March 2023; Accepted 13 September 2023

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### ABSTRACT

Biological aerated filters (BAF) are attached growth aerobic systems used for the treatment of wastewater. This system can establish the physical filtration of solids along with the biological decomposition of organic matter. The performance of the BAF depends on the type of support media and its ability to meet objective of the treatment process. Natural zeolites, with properties such as ion exchange, larger surface area, capability to form biofilm, adsorption, regenerative properties etc., are a promising filter material in BAF systems. This paper investigates and discusses the effect of various factors like hydraulic retention time (HRT), carbon to nitrogen (C/N) ratio, aeration rate, depth of filter and particle size of natural zeolite which influence the performance of BAF. Based on the experimental results and optimization study using response surface methodology, carried out on the BAF system with varying process variables like HRT, C/N ratio, aeration rate and depth of filter, the natural zeolite media with particle size 1–3 mm range showed improved performance as compared to the coarser particles, that is, 3–5 mm and 5–10 mm. On conducting a final run using natural zeolite particle size of 1–3 mm under optimized value of HRT = 3.25 h, C/N = 6.2, aeration rate = 69 L/h, depth of filter = 83 cm, the BAF system observed chemical oxygen demand, biological oxygen demand, NH<sub>3</sub>-N, turbidity and total dissolved solids removal percentage of 97%, 96%, 99%, 98% and 58%, respectively.

*Keywords:* BAF; Natural zeolite; Bio-film; Particle size; Response surface methodology; Central composite design

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