

The study of optimal ozone dose for industrial ozone installation in textile wastewater reuse

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ABSTRACT

Textile production is one of the most water-consuming industries. Closing the water loop by treatment and recycling is highly desirable in this regard. However, textile wastewater treatment is not standard on an industrial scale, and the Polish textile factory Bilinski is one of very few with a functional wastewater recycling system. This study investigates the operational conditions of the industrial ozone system at Bilinski Co., (Konstantynow Lodzki, Poland). An ozone reaction column from Thies GmbH (Germany) with a volume of 7 m³ was used to determine the optimal ozone dose in a closed water loop for textile wastewater reuse. An ozone measurement system from BMT Messtechnik GmbH (Germany), a 965OG ozone concentration metre, and a DH7 dehumidifier were used to determine the ozone in the gas phase. The applied ozone dose and transferred ozone dose (TOD) were calculated based on these data. Three values of TOD, 62.9, 37.7, and 27.0 g/m³, were used for wastewater. A colour reduction of 97% was achieved after 8, 9, and 11 min of treatment. The test showed that the higher the TOD was, the shorter the treatment. Consequently, the average optimal ozone concentration was 32.4 ± 5.5 g/m³. However, this value was roughly estimated because of the industrial scale of the process. It can be assumed that after transferring this ozone concentration, 97% colour removal is possible. Finally, the faster the optimal ozone concentration was transferred, the shorter the treatment time. The experiment showed how operational conditions could be investigated in a high-volume industrial system.

Keywords: Industrial ozone system; Textile wastewater; Wastewater recycling; Ozone measurements

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