EFFECT OF OZONE ON PHOTOCATALYTIC OXIDATION OF ACETONE VAPOUR

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The study of the gas-phase photocatalytic oxidation of acetone in the presence of ozone on P25 TiO_2 coated glass plates and under UV-A irradiation was performed. Acetone as one of the most abundant hazardous volatile organic compounds (VOC) was selected as a target pollutant due to its appearance in exhaust gases and ambient air, thereby possessing a harmful effect on human health and the environment [1]. The objective of the study was to demonstrate the influence of the presence of ozone in small concentrations (ca 150 μg L^{-1}), concentration of acetone, residence and specific residence time and air humidity on the degradation of the organic pollutant by using the continuous multi-section photocatalytic reactor. The unique apparatus, where sequential addition of the sections of the reactor is possible, allows studying different air flow regimes, while the residence time remains constant.

The present study revealed the amplifying effect of the combination of ozone and photocatalytic oxidation. The application of ozone indicated the positive impact on the degradation, as the acetone decomposition was more rapid compared to that without ozone requiring lower overall residence time in the reactor. In the absence of ozone there was no significant influence of acetone inlet concentration (in the range of 20-60 ppm) on the decomposition of acetone observed. Ozone, however, promoted the oxidation of acetone, but only at its lower inlet concentration (20 ppm). Humidity demonstrated no major effect on the oxidation of acetone either with ozone or without ozone.

References

1. Y. Feng, W. Wang, Y. Wang, J. Sun, C. Zhang, Q. Shahzad, Y. Mao, X. Zhao, Z. Song, 2018, *Experimental study of destruction of acetone in exhaust gas using microwave-induced metal discharge*, 645, 788 – 195.

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