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خلاصه مقاله:

Background: As a human carcinogen, formaldehyde is a toxic chemical imposing adverse effects on public health and environment. Due to its high reactivity, colorless nature, sustainability, purity in commercial forms, and low prices, the production and consumption of this compound has expanded vastly in industries.Methods: In this study, a UVC photoreactor with a total volume of 120 mL was used and operated in a rotary mode. To determine the residual concentration, high-performance liquid chromatography (HPLC) device was applied whose detector was set at a wavelength of 355 nm and equipped with C18 column (with dimensions of 25×4.6 mm i.d, and particle size of 5 μm). Total organic carbon (TOC) was determined using a TOC analyzer. Results: The optimal condition in this study was obtained at pH=3 and formaldehyde concentration of 350 mg, so that the removal of formaldehyde and TOC was 98.2% and 95.1%, respectively, after 35 minutes reaction time. The formaldehyde removal efficiency was assessed in the presence of methanol (MeOH), tert-butyl alcohol (TBA), and salicylic acid (SA) scavengers, and it was indicated that $SO_4^{\bullet-}$ radicals were the most effective factors in formaldehyde destruction. By increasing the concentrations of MeOH, TBA, and SA to 2.5 g/L, the degradation efficiency of formaldehyde dropped from 98.02% to 69.78%, 64.68%, and 45.14%, respectively, at 35 minutes reaction time. The removal of formaldehyde in the presence of nitrate was significantly reduced and it had a significant effect on the removal of formaldehyde. Conclusion: In this study, the removal of formaldehyde was investigated in the presence of various anions including bicarbonate, carbonate, chloride, sulfate, and nitrate. According to the results, the UVC/S2O8 2- process is a convenient and cost-effective method for the removal of formaldehyde

کلمات کلیدی:

Formaldehyde, Advanced oxidation, Bicarbonates, Carbonates, Sulfates, Nitrates

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