

Supercritical Water Oxidation of Acrylonitrile Wastewater and Copper Containing Wastewater

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The wastewater from an acrylonitrile manufacturing plant, which is difficult to biodegrade, was decomposed in subcritical and supercritical water. Experiments were carried out at temperatures from 299 to 552 °C at a fixed pressure of 25 Mpa. The residence times ranged from 3 to 30 s, and the initial total organic carbon (TOC) of acrylonitrile wastewater was set from 0.27 to 2.10 mol/L. 30 wt% H₂O₂ solution was used as an oxidant and the stoichiometric ratios of O₂ based on the initial TOC concentration ranged from 0.5 to 2.5. The TOC conversion was increased with increased reaction temperature and residence time. The initial TOC concentration of acrylonitrile wastewater had negligible effect on the TOC conversion. The TOC decomposition rate of acrylonitrile wastewater was accelerated by mixing Cu-containing wastewater. During supercritical water oxidation (SCWO) of this mixed wastewater, in situ formation of copper oxide nanoparticles was found. The results of this study showed that the SCWO process recovered copper ion as copper oxide nanoparticles from the mixed wastewater.