# EFFECT OF PROCESS PARAMETERS ON DESULFURIZATION EFFICIENCY IN THE ULTRASOUND-ASSISTED OXIDATIVE DESULFURIZATION

Ming-Chun Lu[1], Meng-Wei Wan[2], Luisa CydCharisse Biel[3]
Rizalinda de Leon[4], and Susan Arco[5]

[1*]*Department of Environmental Resources Management, Chia-Nan University of Pharmacy and Science, Tainan, Taiwan 71710, R.O.C.*
[2]*Department of Environment Engineering and Science, Chia-Nan University of Pharmacy and Science, Tainan, Taiwan 71710, R.O.C.*
[3]*Environmental Engineering Graduate Program, University of Philippines-Diliman, Quezon City 1800, Philippines*
[4]*Department of Chemical Engineering, University of Philippines-Diliman, Quezon City 1800, Philippines*
[5]*Institute of Chemistry, University of Philippines-Diliman, Quezon City 1800, Philippines*

**Corresponding author: mmclu@mail.cnu.edu.tw; Tel: +886-6-266-7323*

## ABSTRACT

Ultrasound-assisted oxidative desulfurization (UAOD) of dibenzothiophene (DBT) and benzothiophene (BT), using $H_2O_2$ as oxidant, was carried out in the presence of phosphotungstic acid and phase transfer agent (PTA) at 50 – 80 ℃. The effect of process parameters such as temperature, amount of catalyst, amount of PTA, and amount of hydrogen peroxide were investigated to determine the highest reaction rate. The ability to control and predict the influence of various process parameters during the desulfurization process is vital for the enhancement of the system. An increase in temperature from 50 – 80 ℃ resulted to an increase in the desulfurization efficiency. Deep desulfurization of DBT and BT with high selectivity was achieved after 15 min of treatment when the temperature was regulated to 80 ℃ under atmospheric pressure. The optimum amount of PTA with 0.2 g of catalyst to achieved 99% conversion of BT and DBT to their corresponding polar sulfones were 0.10 g and 0.05 g, respectively. The activity of BT also increased markedly when the amount of hydrogen peroxide increased. For DBT, as low as 16% of $H_2O_2$ can lower the concentration from 500 ppm to 10 ppm within 10 min at 80 ℃. The UAOD follows pseudo-first order kinetics.

## KEYWORDS

Benzothiophene; Dibenzothiophene; Phase transfer agent; Phosphotungtic acid; Ultrasound-assisted oxidative desulfurization