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Decomposition of Benzothiophene, Dibenzothiophene, and Their Derivatives in Subcritical and Supercritical Water with Alkali

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Hydrothermal decomposition of thiophene derivatives in subcritical and supercritical water with alkali was studied to enhance desulfurization using a new on-site upgrading technology. Benzothiophene, dibenzothiophene, and derivatives (BTs and DBTs) can be decomposed by hydrothermal reaction with alkali in a temperature region where thermal decomposition is difficult. The ease of decomposition is influenced by the type and concentration of the alkali solution. Decomposition in KOH solution is the most complete, and occurs at a certain alkali concentration.

The reaction is sensitive to the pressure in supercritical water. Moreover, the reaction products of hydrothermal decomposition obtained in the present study differ to those by the hydrodesulfurization method (HDS) previously reported by other researchers. These results suggest that the mechanisms of decomposition are different and hydrothermal decomposition is preceded by ionic reaction. The ease of decomposition of BTs and DBTs is influenced by the molecular structure, similar to the trends seen in HDS.

Keywords: [Supercritical water](#), [Subcritical water](#), [Benzothiophene](#), [Dibenzothiophene](#), [Desulfurization](#)



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