

Fundamental Studies of Metalloporphyrin Catalyzed Oxidation of Dibenzothiophenes

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Oxidative desulfurization (ODS) is an alternative to the traditional hydrodesulfurization (HDS) process for the removal of sulfur containing compounds from fuels. Dibenzothiophene and its alkyl derivatives are not removed efficiently by HDS. ODS treatment is an oxidation-extraction procedure that has shown promise for removing these compounds. We have identified iron tetra(perfluorophenyl)porphyrin chloride as an efficient catalyst for the oxidation of DBT, benzothiophene, 4-methyldibenzothiophene and 4,6-dimethyldibenzothiophene by hydrogen peroxide. The sulfoxides and sulfones were identified as the main products by GC-MS and UV-visible spectroscopy. A model fuel was created by dissolving all 4 substrates in octane. Extraction of the octane layer with methanol reduced the sulfur content by 50% while oxidation followed by extraction reduced the total sulfur content by 91%.

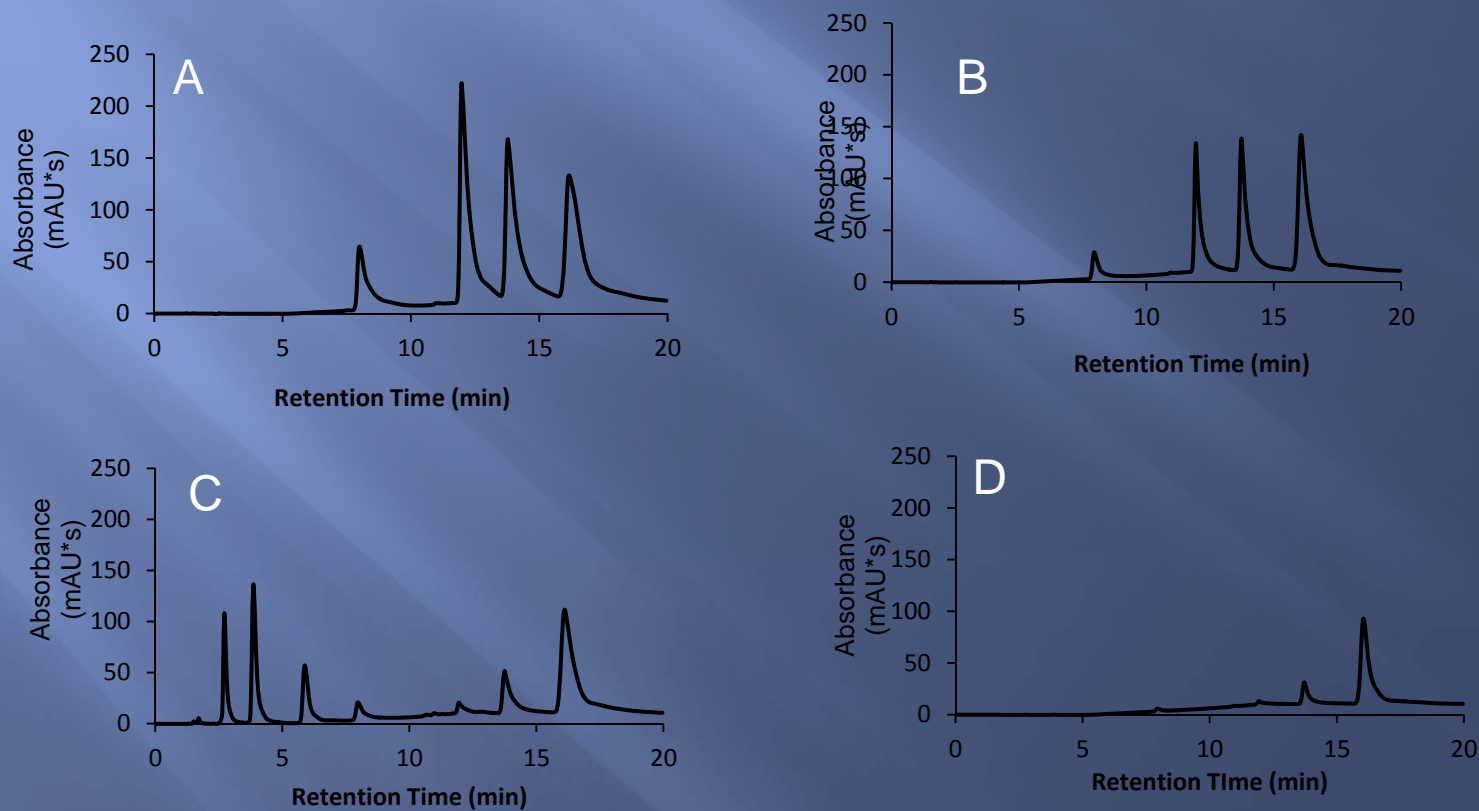


Figure 1. HPLC chromatograms of model fuel (A), model fuel after extraction (B), model fuel after oxidation(C) and model fuel after oxidation and extraction(D).