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ABSTRACTS

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Removal Of 2,5-Dichlorophenol from Air Using Zeolite Based Catalysts

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Volatile organic compounds (VOCs) are classified as hazardous air pollutants since they negatively impact the ecosystem and cause a variety of health issues. The 2,5-Dichlorophenol (2,5-DCP) is the selected VOC in this study. Due to its recalcitrant characteristics, 2,5-DCP is not easily biodegradable. The 2,5-DCP is classified as a high production volume chemical. To limit VOC emissions, a simple enclosure is not enough. Catalytic degradation has proven to be an efficient method to treat VOCs. Among VOC controlling techniques, the use of zeolite-based catalysts is a promising strategy. Therefore, this study focused on the degradation of 2,5-DCP using Cu modified zeolite catalysts. The adsorptive degradation capability of 2,5-DCP over Cu/Y and Cu/ZSM (Zeolite Socony Mobil)-5 zeolite was investigated. ZSM-5 zeolite was synthesized via microwave assisted hydrothermal method. X-ray diffractometer (XRD), Fourier-transform infrared spectroscopy (FTIR), and Raman spectroscopy were used to evaluate the quality characteristics of Cu/ZSM-5 zeolite. Results revealed the presence of ZSM-5 zeolite. The adsorption of 2,5-DCP on Cu/Y and Cu/ZSM-5 zeolite was studied. The variable effects of zeolite dosage, contact time, temperature, initial 2,5-DCP concentration and 2,5-DCP volume were investigated. Adsorption capacities and removal efficiencies were studied to investigate optimal conditions for 2,5-DCP degradation. The qualitative and quantitative data of 2,5-DCP degradation process were obtained and analyzed via gas chromatography mass spectrometry (GC-MS). At optimum conditions, dosage, time, temperature, concentration and volume to be 8 mg, 60 minutes, 100 $^{\circ}$C, 4 mM and 200 µl respectively. Pseudo second order kinetic model fitted well with the adsorption data (R^2 = 0.8377). The GC-MS and Raman spectroscopy data revealed that both Cu/Y and Cu/ZSM-5 zeolite has degraded 2,5-DCP. Cu loaded Y zeolite and ZSM-5 zeolite can be applied as promising adsorbents in removal of 2,5 dichlorophenol.

Keywords: adsorption, chlorophenols, catalyst, volatile organic compounds, zeolites