THERMAL DECOMPOSITION OF 2-(CHLOROETHYL)BENZENE STUDIED VIA MATRIX-ISOLATION FTIR

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Chemical recycling of plastics is an important strategy to improve both the effectiveness and financial sustainability of plastics recycling. Pyrolysis of plastic to decompose polymers, followed by the refining of the pyrolysate into valuable chemicals, is advantageous but there is an incomplete understanding of the chemical mechanisms governing plastics pyrolysis. Pyrolysis of the plastic polyvinyl chloride produces a variety of chlorinated hydrocarbons, such as 2-(chloroethyl)benzene. The purpose of these experiments is to probe the pyrolysis pathways of 2-(chloroethyl)benzene via matrix-isolation FTIR. A dilute mixture of the sample in argon was subject to pyrolysis in a resistively heated SiC tubular reactor at temperatures up to 1400 K. Matrix-isolation FTIR spectroscopy was used to identify pyrolysis products. The products observed include HCl, acetylene, ethylene, propyne, isobutene, vinylacetylene, propargyl radical, styrene, and phenylacetylene. Matrix-isolation FTIR spectra were recorded for commercial samples of styrene and phenylacetylene in order to verify the assignment of these species in the spectra collected following pyrolysis of 2-(chloroethyl)benzene.