

CHARACTERIZATION OF 4-PYRONE PYROLYSIS PRODUCTS VIA MATRIX-ISOLATION FT-IR

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The characterization of the byproducts of biomass pyrolysis is an integral part in the development of viable biofuels and renewable energy sources. 4-Pyrone, (IUPAC name: 4-pyran-1-one) is one of the byproducts observed in the pyrolysis of many forms of biomass, such as wood chips, straw, and cotton husks. Using the technique of argon matrix-isolation FT-IR spectroscopy, the pyrolysis products of 4-pyrone were characterized by passing a diluted sample of 4-pyrone through a heated silicon carbide tube onto a cold window that captures the products and allows for their analysis via FT-IR spectroscopy. Computational analysis using Gaussian 09 was also utilized to model the unimolecular decomposition pathways, and these results were compared to the experimental spectra for product identification. Current data collected at pyrolysis temperatures ranging between 900 K and 1400 K indicate the formation of acetylene, vinylacetylene, propyne, and carbon monoxide. The formation of formylketene is also likely, as some peaks have been observed that match computational predictions.