A GREEN BANK TELESCOPE SEARCH FOR *ORTHO*-BENZYNE (o-C_6H_4) IN CRL 618

SUSANNA L. WIDICUS WEAVER, *Departments of Chemistry and Astronomy, University of Illinois at Urbana-Champaign, Urbana, IL 61801*; ANTHONY J. REMIJAN, *National Radio Astronomy Observatory, Charlottesville, VA 22903*; ROBERT J. McMAHON, *Department of Chemistry, University of Wisconsin, Madison, Wisconsin 53706*; BENJAMIN J. McCALL, *Departments of Chemistry and Astronomy, University of Illinois at Urbana-Champaign, Urbana, IL 61801*.

The existence of interstellar polycyclic aromatic hydrocarbons (PAHs) is inferred from the ubiquitous unidentified infrared bands (UIRs). PAHs and their cations are also often suggested as possible carriers of the diffuse interstellar bands (DIBs). There is no known formation route for PAHs by gas-phase or solid-state interstellar chemistry, and so it is often postulated that PAHs are produced in the outflows of carbon-rich evolved stars. Models suggest that PAHs are formed by pathways involving benzene (C_6H_6) and its derivatives $ortho$-benzyne (o-C_6H_4) and the phenyl radical (C_6H_5). A tentative infrared detection of benzene has been reported in the envelope of the proto-planetary nebula CRL 618, but no other benzene-related species has been detected in this or any other source. Detection of a benzene derivative would be the first direct evidence of PAH formation in space, opening the door to a new branch of astrochemistry. We have conducted highly sensitive Ku-Band (12.0 – 15.4 GHz), K-Band (18.0 – 26.5 GHz) and Q-band (39.2 – 49.8 GHz) searches with the Green Bank Telescope (GBT) for o-C_6H_4, for which the microwave spectrum is much stronger and simpler than that of C_6H_5. No lines were observed, but strict upper limits on the column density have been derived from the results of these observations. These limits and their implications for benzene-related chemistry in CRL 618 will be discussed.