

ROVIBRATIONAL STUDY OF HNCS PRODUCED VIA ELECTRIC DISCHARGE IN A NEWLY CONSTRUCTED MULTIPASS IR CELL AT THE CANADIAN LIGHT SOURCE SYNCHROTRON

JENNIFER VAN WIJNGAARDEN, AIMEE BELL, WENHAO SUN, *Department of Chemistry, University of Manitoba, Winnipeg, MB, Canada*; BRANT E. BILLINGHURST, *EFD, Canadian Light Source Inc., Saskatoon, Saskatchewan, Canada*.

A custom-built multipass gas cell capable of supporting a high voltage electric discharge in situ was constructed and installed on the far infrared beamline at the Canadian Light Source (CLS). The 1.4 m cell can be aligned to achieve a total absorption pathlength of 24 m and when combined with a Bruker IFS12HR FTIR spectrometer (0.000959 cm^{-1}) and synchrotron light, this new experiment is designed to collect high resolution infrared spectra of the complex mixture of molecular species generated in a high voltage (up to 3 kV) discharge. Preliminary tests have included CH_3NCS as a precursor to generate HNCS, a known astronomical species. The rich spectra recorded at the CLS include series of pure rotational transitions in the far IR region below 500 cm^{-1} and rotationally resolved vibrational bands of which the strongest is the CN stretching mode at 1989 cm^{-1} . The ongoing analysis of the rovibrational spectrum of this highly fluxional molecule will be discussed. These preliminary studies lay the foundation for improved descriptions of the lowest energy states of floppy molecules and the far IR signatures needed to pursue their astronomical detection.