

Low-Temperature Thermodynamic Properties of Some Light Hydrocarbons

John E. Allen, Jr.* Robert N. Nelson†

February 3, 2006

Abstract

Light hydrocarbons are important constituents in a variety of astrophysical systems and their components, including ices and icy mantles on grains. The first-order equilibrium models developed to describe these systems require accurate laboratory data as inputs. It is important that these data be acquired over the appropriate range of parameters, e.g., temperature, and in this regard there is a particular need for thermodynamic properties of molecular constituents at low temperatures. We have developed an apparatus capable of measuring low-temperature vapor pressures, experimentally determined values for which are extremely limited, and have undertaken a program to systematically provide this information for molecules and mixtures of importance to the astrophysical and planetary communities. Here we describe our apparatus and present results for the low-temperature vapor pressures and heats of sublimation for a group of light hydrocarbons.

*Code 691/Astrochemistry Laboratory NASA Goddard Space Flight Center

†Catholic University of America/NASA Goddard Space