A STUDY OF HCO^+ AND CS IN PLANETARY NEBULAE

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Millimeter-wave observations have been conducted towards a sample of planetary nebulae (PNe) using the 12-meter and Sub-millimeter telescopes of the Arizona Radio Observatory. HCO^+ was observed in the J=3-2 transition at 1 mm and the J=1-0 transition at 3 mm. CS was observed in the J=5-4, J=3-2, and J=2-1 transitions at 1, 2, and 3 mm, respectively. Both molecules have been detected in NGC 6537 (Red Spider Nebula), K4-47, and M2-48, as well as NGC 6720 (Ring Nebula) and NGC 6853 (Dumbbell Nebula), which are both over 7,000 years old. Although a number of molecular line surveys of circumstellar envelopes have been done and one conducted towards a very young PNe, the molecular content of planetary nebulae is not well characterized. It was previously thought that the high ultraviolet radiation field of the central star would destroy any molecules leftover from the circumstellar envelope; however, molecules clearly exist well into the PNe stage. These data are currently being analyzed and molecular abundances being determined, which will be compared to those seen in diffuse interstellar material. The implications of these observations will be discussed in relation to the molecular content of diffuse clouds and the origins of the diffuse interstellar bands.