

CONTROL ID: 2243158

TITLE: Gas molecules in 21 and 30 micron emitters

ABSTRACT BODY:

Abstract Body: A small fraction of evolved stars exhibit two extraordinary features at 21 and 30 micron. Identification of the two features is a long-standing challenge and important for understanding circumstellar chemistry. In order to investigate chemical processes in the 21 and 30 micron emitters, we report the results of molecular line observations toward two evolved stars, IRAS 21318+5631 and 22272+5435. Both 21 and 30 micron features have been detected in IRAS 22272+5435, while IRAS 21318+5631 is a 30 micron source. The observations were carried out in 1.3mm and 2mm windows, resulting in a detection of 13 molecular species in each object. We perform rotation diagram analysis to determine molecular abundances, column densities, and excitation temperatures. All the detected gas molecules in the two IRAS sources are typically present in normal carbon-rich stars, and no unexpected species is detected in the two sources. Nevertheless, there exists subtle difference between their molecular abundances. IRAS 22272+5435 shows stronger SiC₂ and HC₃N lines and weaker SiS lines with respect to IRAS 21318+5631, presumably suggesting that the 21 micron source is essentially more carbon rich and retains more severe dust formation.

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PRESENTATION TYPE: Poster