

P117a NLTE Analysis of SO in Star-forming Regions

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In star formation studies, sulfur-bearing molecules are important tracers for the heated gas, such as shocked-gas associated with accretion and outflows. In particular, SO is often used to probe various protostellar activities, with its abundance and chemical evolution being highly sensitive to the physical conditions. The SO-abundant regions are often in non-local thermodynamic equilibrium (NLTE) conditions with high temperature and radiation. To model molecular emission in NLTE environments, accurate and comprehensive collisional rate coefficients are needed while often being of limited availability. Here, we present NLTE analysis of SO in star-forming regions with SO-H₂ rovibrational collisional data (v up to 2) from state of the art quantum calculations. SO abundance and the physical conditions of the gas are constrained with NLTE simulations in both low- and high-mass protostars. Furthermore, the impact of the updated data in various astrophysical environments, including photodissociation regions (PDR), is investigated.