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Ultracold Rotational Quenching Study of CO with H^+ RAJWANT KAUR, T. J. DHILIP KUMAR, Department of Chemistry, Indian Institute of Technology Ropar — Cooling and trapping of polar molecules have stimulated research in precise monitoring and controlling dynamics in ultracold regime. There has been considerable interest in the study of molecular inelastic collision processes at cold and ultracold temperatures. Collisional study of polar interstellar species CO, adds an additional astrophysical importance to model interstellar medium. Present work focuses on rotational quenching of abundant interstellar species, CO with H^+ using quantum-mechanical scattering calculation. Rate coefficients for molecular rotational transitions of CO due to collision with H^+ are obtained in the range of 10^{-5} K to 200 K from cross sections which are computed using close coupling calculations as implemented in MOLSCAT. The data generated from ultracold to higher temperatures assist in investigating the chemistry of interstellar clouds. Calculations are performed on ground state *ab initio* potential energy surface using MRCI/cc-pVTZ method. Rotational transitions are studied in the rigid-rotor approximation with CO bond length fixed at an equilibrium value of 2.138 a.u. Asymptotic potentials are computed using the dipole and quadrupole moments, and the dipole polarizability components.

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