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Energy transfer in collisions of atmospheric O and H_2 MARKO GACESA, PENG ZHANG, VASILI KHARCHENKO, Harvard-Smithsonian Center for Astrophysics — We report new differential and total cross sections calculated quantum mechanically for $O(^3P) + H_2(v, j)$ reactive collision using the most recent chemically accurate potential energy surfaces for $^3A'$ and $^3A''$. Reactive state-to-state calculations were performed at energies important for astrophysical environments and planetary atmospheres for total angular momenta up to $J = 100$, and non-reactive cross sections were constructed for higher values of J. Corresponding differential cross sections were used to construct the kernel of Boltzmann equation and calculate energy relaxation of hot oxygen atoms in collisions with H_2. Escape of molecular hydrogen from planetary atmospheres and the role of angular anisotropy of the scattering are also discussed.

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