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Prospects for efficient sympathetic cooling of OH radicals by ultracold Sr atoms[1] MING LI, ALEXANDER PETROV, JACEK KŁOS, SVETLANA KOTOCHIGOVA, Temple University — There is great interest in direct cooling of molecules down to μK temperatures. One candidate molecule is the hydroxyl (OH) radical, which can not be laser cooled but is of interest to chemistry. A recent experiment [1] has succeeded to translationally cool OH to 5 mK via evaporative cooling. Sympathetic cooling of molecules in collisions with laser-cooled atoms can assist further cooling down to μK. Here, we theoretically explore the translational cooling of OH in collisions with Sr. First, we computed the multi-dimensional potential surfaces of SrOH. Second, for coupled-channels calculations we add spin-orbit, Omega doubling, Coriolis, and hyperfine interactions to describe OH. We also include non-adiabatic couplings between the potential energy surfaces, which have conical intersections (CIs) in collinear geometries. Finally, we computed the ratio between the rate of elastic or momentum-changing collisions and the rate for inelastic or energy releasing collisions at various entrance channels and collision energies. The role of the CIs is also investigated. [1] B. K. Stuhl, M. T. Hummon, M. Yeo, G. Quéméner, J. L. Bohn, and J. Ye, Nature, **492**, 396 (2012).

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