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Towards producing ultracold $CaNa^+$ molecular ions in the ground electronic state[1] MARKO GACESA, JOHN A. MONTGOMERY, HARVEY H. MICHELS, ROBIN CÔTÉ, University of Connecticut - Storrs — We present a theoretical analysis of optical pathways for the formation of cold $Ca(^1S)Na^+(^1S)$ molecular ions, based on accurate potential energy curves and transition dipole moments calculated using effective-core-potential methods of quantum chemistry. In the proposed approach, starting from a mixture of trapped laser-cooled Ca^+ ions immersed into an ultracold gas of Na atoms, the $(NaCa)^+$ are photoassociated in the excited $E^1\Sigma^+$ electronic state, followed by spontaneous radiative charge transfer and emission through an intermediate state. We find the optimal formation pathway and report radiative charge-exchange cross sections and vibrational distributions of participating electronic states.

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