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Lifetime Calculations of Selected Ro-Vibrational Levels of the $6^1\Sigma_g^+$ State of the Na_2 Dimer and Comparison to Experiment SETH ASHMAN, Providence College, S. BURCIN BAYRAM, Miami University, EMMA MCLAUGHLIN, AMELIA PALADINO, Providence College, MICHAEL SAARANEN, DINESH WAGLE, Miami University — Lifetimes of ro-vibrational levels of the $6^1\Sigma_g^+$ state of Na_2 have been calculated using best available potential energy curves of relevant molecular states and transition dipole moment functions. The Level program by Le Roy has been used to calculate Einstein coefficients of transitions from selected $6^1\Sigma_g^+$ ro-vibrational levels in the range v =0-200 with J =1 and J =31 to all dipole allowed ro-vibrational levels of the $1\,(A)^1\,\Sigma_u^+$, $1\,(B)^1\,\Pi_u$, $2^1\Sigma_u^+$, $3^1\Sigma_u^+$, $2^1\Pi_u$, $4^1\Sigma_u^+$, $3^1\Pi_u$ states. Bound-free transitions have been calculated using the BCont program, and the outputs of these two programs are combined to determine the radiative lifetimes of selected $6^1\Sigma_g^+\,(v, J)$ levels. Comparison to experimentally measured lifetimes shows favorable agreement. We have applied a similar computational approach to determine radiative lifetimes of ro-vibrational levels of the $2^1\Sigma_u^+$ and $4^1\Sigma_u^+$ states of Na_2, yielding good agreement with experimentally determined lifetimes, and we note this approach could be applied to other systems for which reliable potential energy curves and transition dipole moment data is available.

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