Observation of sodium molecular formation induced by resonant laser atomic excitation and three-body collisions

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Abstract

A huge chemical shift in the sodium atom–dimer reaction is observed in a gas buffered cell upon resonant laser excitation. Atomic fluorescence quenching and molecular fluorescence enhancement are simultaneously detected during a few ms resonant laser pulse. The chemical shift is due to the formation of an excited sodium molecule in a three-body collision between two sodium atoms (at least one of them excited) and a buffer gas atom, followed by molecule stabilisation through radiative decay to the bound ground state. The dependence of the chemical shift on the buffer gas pressure, on the sodium density and on the laser intensity has been measured and agreement with our model has been found. © 1999 Elsevier Science B.V. All rights reserved.

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