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Self-Diffusion Coefficient of a Weakly Ionized Cesium Monatomic Gas. Symmetry Effects[1] MONCEF BOULEDROUA, M. TAHAR BOUAZZA — The quantum-mechanical computation of the diffusion coefficient D begins with the determination of the singlet and triplet potential-energy curves which, in this work, separate asymptotically to Cs(6s)+Cs(6s). The knowledge of these potentials should lead to the determination of the phase shifts. Ignoring the identity of the interacting atoms, the cross section effective in diffusion is calculated for one molecular symmetry and the coefficient of diffusion is determined according to the Chapman-Enskog method. In reality, the colliding atoms are identical. Thus, the wave function of the diatomic system should be symmetrized. In such a case, quantum mechanics leads to symmetric and antisymmetric diffusion cross sections, as described by Karstic and Schultz, and the average diffusion cross section is recalculated by considering the Cs nuclear spin and the statistical weight of each molecular state. The evaluation of the self-diffusion coefficient of a dilute Cs gas is in a first step carried out without considering the symmetry effects. The results are compared with those of Nieto de Castro et al. The variation law with temperature of D are further analyzed when the symmetry effects are ignored/included.

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