

KINETICS OF THERMAL EXCITATION
OF A MOLECULE IN A CONDENSED MEDIUM

V.I. Teslenko¹, D.Y. Iatsenko²

¹Bogolyubov Institute for Theoretical Physics,
Nat. Acad. of Sci. of Ukraine
(14b, Metrolohichna Str., Kyiv 03680, Ukraine;
e-mail: vtes@bitp.kiev.ua),

²National Taras Shevchenko University of Kyiv
(2, Prosp. Glushkova, Kyiv 03022, Ukraine)

S u m m a r y

A microscopic model of thermal excitation of the vibrational ground state of a molecule interacting with a condensed medium is developed. The master equation for the evolution of occupancies of vibrational levels is derived. The rate constant limiting the process of molecular thermal excitation is determined analytically. It is shown that while this quantity is independent of the temperature at low temperatures, by coinciding with a rate speed limit for quantum transitions due to the uncertainty principle, it rises rather linearly with the temperature at high temperatures according to the Einstein's relation for adiabatic transitions.