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Sommario/riassunto	This text explores methodologies that can be usefully applied to various realistic problems in molecular spectroscopy and chemical dynamics. It covers the direct evaluation of reaction rate constants for both electronically adiabatic chemical reactions on a single adiabatic potential energy surface and non-adiabatic chemical reactions in which two or more adiabatic potential energy surfaces are involved. It also discusses the non-adiabatic tunneling phenomenon that represents one class of non-adiabatic transitions on which the authors have made an extensive research so far--