THE EFFECT OF KINEMATIC FACTORS ON ROTATIONALLY AND ROVIBRATIONALLY INELASTIC SCATTERING OF GLYOXAL

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State-to-state rotationally and rovibrationally inelastic scattering of S_1 0^0, $K' = 0$ *trans*-glyoxal has been shown to be controlled by the kinematics of the collision. More details of this kinematic effect have been extracted from new glyoxal + H_2, D_2, He and Ne scattering experiments under well defined center-of-mass collision energies ($E_{c.m.}$) and momenta ($p_{c.m.}$). The experiment couples a laser pump-dispersed fluorescence probe approach with crossed molecular beams. The relative velocity (v_{rel}) of the collision pair was tuned by adjusting the beam intersection angle so as to select the desired $p_{c.m.}$ or $E_{c.m.}$. The distributions of relative rotational and rovibrational cross sections have an exponential dependance on the angular momentum change for all values of kinematic parameters. The slopes of these dependencies have a well-defined trend as a function of $p_{c.m.}$ regardless of the target gas identity. In contrast, analogous plots against v_{rel} or $E_{c.m.}$ tend to be unique for each target gas. This behavior suggests that the momentum is the most convenient kinematic factor for discussing the cross section distributions.